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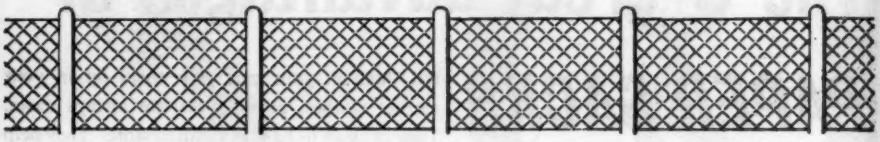

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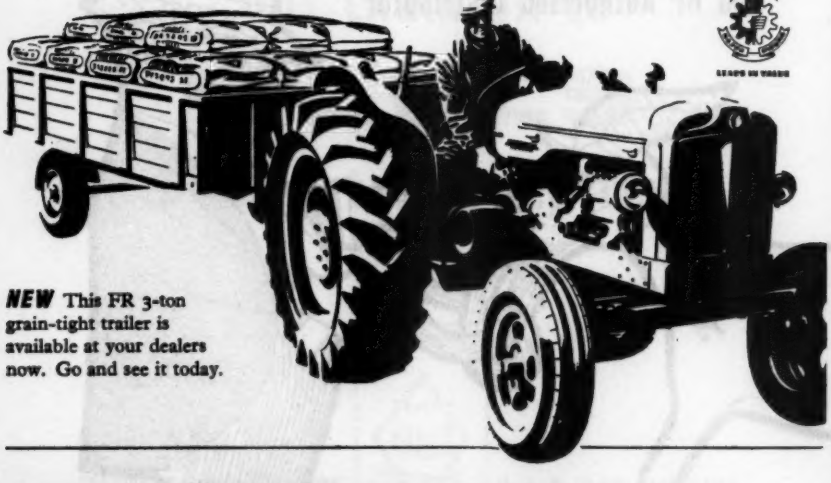

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The Problem of Seasonal Farm Work

D. H. LLOYD, B.SC., and J. H. ROWLEY, B.SC.,
Department of Agriculture, Reading University

Careful planning, together with relatively simple changes in husbandry practices and work methods can often even out the demands made on the labour force.

TODAY, the labour bill accounts for nearly one-third of the total costs of the farming industry, and the efficiency with which labour is used may mean all the difference between profit and loss for many farms. It is one of the most difficult tasks of the manager to assess how well labour is being used. Efficiency must be judged not only on labour costs, but also in relation to other costs and the output achieved. Too often attempts to keep the farm labour bills low give rise to high repair costs and heavy buying of proprietary products, or result in poor output or neglectful farming.

In an ideally organized farm, the fluctuation from year to year and month to month in labour requirements would be exactly matched by variations in the total labour force on the farm. To attain this ideal with agricultural labour, is problematical. In the first place, it is difficult to assess how much labour is necessary; vagaries of climate and the uncertainties of the natural and biological processes involved in farming make it almost impossible to foresee the position from one year to another, and the matter is further complicated by the fact that labour requirements vary from season to season of the same year. Although the demand may vary by only 5–10 per cent between one year and the next, there may be a difference of 30–60 per cent between seasons of the same year. Such fluctuations would not in themselves cause inefficiency if the supply of agricultural labour was equally flexible, but it is not, and to cope with peak seasonal labour demands, farmers may have to over-mechanize or carry a staff too large to be fully occupied productively in slack seasons.

Some indication of the magnitude of the organizational problems created by fluctuating seasonal labour requirements, may be judged from the following estimate. If it were possible to even out labour requirements to occur equally in each month, some 80,000 men (that is, 10 per cent of the working force) could probably be released from the farming industry, and the annual saving in labour costs would be nearly £30 million.

The seasonal labour requirements vary in intensity and timing with the physical conditions of the farm, and the pattern of enterprises undertaken. They may, therefore, differ entirely on an arable farm and on a hill sheep farm. In the former case, peak labour demands occur from April to June and August to October, and in the latter, the busiest months may be July, October and March.

Generally, livestock enterprises do not make excessively fluctuating demands for labour except at lambing, shearing and chick-rearing periods, and

the timing of this work can often be fitted to the farmer's convenience by skilful advance planning. Similarly, farm maintenance and miscellaneous jobs can be done when most convenient.

The work demands of crops are, however, relatively inflexible and seasonal. The timeliness of such operations as sowing, singling, after-cultivations and harvesting can be vital to the yields of many crops. The use of different varieties may alter the timing of some work, but most of it must be done in fairly fixed seasons. If several crops require attention simultaneously, high labour requirement peaks occur, and inefficient labour use is almost certain to follow. The merits of several different methods of meeting the problem of peak seasonal labour requirements may be considered.

Supplementing normal working hours

Employment of casual or part-time workers is the best method of meeting seasonal demands, for then labour is paid for only when it is required. However, in recent years such workers have been increasingly difficult to find, and their employment is unlikely to afford a general solution for farmers. Contractors make a useful substitute for casual workers provided their punctuality can be relied upon, but they may prove too expensive for the big jobs.

Today, most farmers have to rely on the regular farm staff working harder and longer hours to cope with peak seasonal demands, but this system has its difficulties. Even with the use of piece-work or incentive schemes designed to stimulate the enthusiasm and performance of men, dissatisfaction is likely to arise if overtime is prolonged. In manufacturing industry, where output can be measured more exactly, it is established that excessive overtime may reduce the speed and accuracy of work not only during overtime hours, but throughout the shift, and the same is certain to apply in agriculture. On the farm, working harder does not always mean working faster. The speed of work in many processes is limited by the speed of the machine, or some natural function in an animal. In general, men cannot be expected to increase their normal working hours by more than 30 per cent for anything but short periods, therefore it appears that the working of overtime hours alone is unlikely to fill the gap between troughs and peaks on the labour demand cycle for most farms.

The great advances in mechanization in recent years have made it possible to cope with many of the seasonal labour peaks. However, having regard to the small size of so many units in British farming, the limited season of use for much equipment and the speed with which it may become out of date, mechanization can prove an expensive method of tackling seasonal labour problems. Sometimes even when mechanization provides the only alternative between production and non-production, it can be uneconomic. On other occasions, although it may be economically desirable, farmers may be unable to afford the initial capital outlay.

It must be remembered that if capital is to be spent in saving labour, the actual costs must be saved out of the wages bill or, alternatively, the farm output must be so increased as to cover the extra costs.

New practices within the system

Improved labour utilization would result in most cases if labour demands occurred more evenly through the year. This can sometimes be achieved by altering the pattern of the farm enterprises. For instance, the spring work peak might be relieved by substituting autumn-sown varieties of corn for spring-sown varieties where suitable, and where this would not upset other aspects of the farm plan (for example, by necessitating the autumn ploughing of grass which would rob the farm of winter keep). Similarly, successional sowings and the use of early- and late-maturing varieties can help to spread the peak work requirements on many crops. If these measures do not provide the answer, the farmer may consider the merits of replacing problem enterprises with others which fulfil a similar function. The spring and early summer work load might be reduced by growing unsingled kale instead of mangolds, or by taking buck-rake silage rather than hay.

However, the farmer must bear in mind that attempts to achieve better labour utilization must not be at the expense of other aspects of the farm economy. It is quite possible that, under some systems of farming, the alternatives suggested above could result in a lower farm output, labour utilization being improved, but the net farm profit reduced. In substituting enterprises there are technical barriers caused by the need for good husbandry practices, and also economic barriers which limit the extent to which farmers can improve labour efficiency.

Seasonal work peaks are aggravated by the fact that most farms were "created" and designed to suit systems and methods different from those now practised. Labour often has to contend with antiquated buildings serving new functions, and difficult field and farmstead layouts; this always leads to waste of time. Where the capital costs of alterations are reasonable in relation to the possibilities of saving labour, expenditure may be well worth while, and often quite simple and inexpensive alterations to layouts can effect considerable savings in labour.

Planning is essential

Sensible work planning can also help to reduce seasonal labour peaks. It is thought that better work methods could save up to a fifth of the time spent on most farm tasks without reducing husbandry standards. Many of the causes of inefficiency are so obvious that it is surprising that they have never been remedied; if once the farmer and worker are made aware of the principles of work organization, they will soon find ways of lessening the work load at peak periods. The convenient siting of work places and equipment with direct access, thinking in advance to avoid back-tracking and double journeys, and synchronizing the efforts of workers one with another and with the equipment they use, all help in keeping labour requirements to a minimum.

Although planning on the farmer's part is vital to efficient labour use, there is no denying the importance of the workers' attitude. There is no general prescription for the wise handling of men, but generally workers will give of their best when contented with their conditions. The farmer may try

to foster this state by high wages and monetary incentives, good working and home conditions, encouragement or example, but he must never neglect it in his planning.

Modern farming methods are much influenced by the traditions of farming evolved and proved in a different era. New conditions may necessitate new methods, and opportunities to save labour by using modified husbandry techniques may occur. For example, it may be possible within certain tolerances to do work out of season, or to advance or retard livestock and crop growth rates by the appropriate means—that is, by hormone treatments, fertilizer policies, irrigation. etc. But few farmers can take the risks or possess the facilities to initiate and prove novel farming methods. The lead in both research and practice may have to come from the universities and colleges, State and ancillary commercial interests.

There is no one set of rules to secure the best use of labour on all farms. In some cases the work force must be adapted to fit the farming system, but in others, the opposite applies. In all instances a keen interest by both farmer and workers in making work simpler and more efficient is essential to success. Planning for the efficient use of labour demands the highest skill. It involves complex and often unpredictable natural, biological and economic relationships, but not least a knowledge of human nature.

Systems of Milk Production in an Arable Area

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Analysis of financial returns from arable dairy herds shows that the traditional system of feeding must be superseded by better systems if milk production is to remain a profitable enterprise.

MILK is the keystone of agriculture in this country: it contributes more to farm output than any other single product. But recently profitability has diminished and, with prospects not particularly favourable, many producers are wondering whether they should change their methods or whether, indeed, they ought to stay in milk production at all. A few years ago it was relatively easy to make a reasonable profit from milk, but for many the stage has now been reached where careful planning is needed if the dairy herd is to justify the resources it uses.

Planning, however, is no easy task, for the producer has many alternative methods from which to choose. The basic problem is to reconcile the policy of maintaining high-yielding cows in an endeavour to spread overheads as thinly as possible, with that where cows of more moderate yields are kept, with the object of lowering costs. In this, feeding plays a major role; high yields usually call for a heavy use of concentrates, whereas lower yields may be obtained largely from bulk foods.

Some light is thrown on this problem by the first results of an investigation being conducted at Cambridge into the pros and cons of different systems of production in an arable area. Herds fall into one of three categories:

1. *Bulk-feed herds* where grazing and bulky foods provide an above average amount of the feed requirement, the actual measure adopted being that more than 45 cwt of hay equivalent* per cow should come from grazing in summer, and less than 4 lb per gallon of concentrates (including dry beet pulp) should be fed in winter.
2. *High-yield herds* where annual production divided by the average number of cows in the herd during the year is at least 1,000 gallons a cow.
3. *Traditional herds* falling between the first two groups, in that less reliance is placed on grazing and bulk feeds than in the first group, but yields are not as high as in the second group.

Nearly all the high-yield herds belong to farmers who, although running mixed-arable farms, are specialists on the dairy side. A few of the bulk feeders also fall into this category. Traditional herds, however, are more typically found on mixed-arable farms where the farmers, who are faced with many conflicting interests and worries, want to get the best they can from their cows, without having to give them an undue amount of attention.

The traditional system

The financial details of the three systems are given in Table 1. The most striking point is that the profitability of the traditional system compares very unfavourably with that of either of the other two systems, net income per cow and per acre being less than half as great. Of equal importance is the fact that the scope for improvement under the traditional system is limited.

Table 1

The Three Systems—Costs and Returns

	Traditional	Bulk-feed	High-yield
Herd size	35·0	42·5	37·7
Yield per cow (gallons)	826	815	1,135
PER GALLON	*d.*	*d.*	*d.*
Receipts	39·33	38·45	39·07
Costs Purchased foods	9·25	5·36	12·14
Home-grown foods	6·32	4·90	4·17
Grazing	2·58	3·52	1·83
Labour	7·12	5·98	6·31
Miscellaneous	4·96	3·79	3·75
Replacement	2·27	0·67	0·85
Total	32·50	24·22	29·05
Net Income	6·83	14·23	10·02
PER COW	£ *s.*	£ *s.*	£ *s.*
Net Income	23 10	48 6	47 8
PER ACRE (cows and followers)			
Net Income	7 11	15 10	15 13

* Hay equivalent expresses the value of grazing in terms of the equivalent weight of good mixture hay. 1 cwt hay equivalent = 39·2 lb starch.

The five herds which, out of all the traditional herds were financially the most successful, netted £47 a cow and £15 2*s*. an acre. Thus the best they could do was to make an income slightly below that of the *average* herd under the other two systems. Also, whereas a quarter of both bulk-feed and high-yield herds made a net income of over £60 a cow, none of the traditional herds reached this high standard.

Since most of the herds in an arable area such as the eastern counties are kept on the traditional system, the revelation of their poor earning power is of some consequence. The dairy enterprise on the arable farm has always been a useful means of cashing grass, consuming by-products and making muck. In performing these functions, it has in the past also been capable of paying its way, but under the current price-cost situation it is in real danger of becoming a liability to the farm. As an example of this trend, an Essex herd may be quoted whose net income of £48 a cow in 1953 had dwindled to £24 a cow in 1956. This was not due to any bad luck or change of policy, for in both years herd production and management were similar. As is shown by the herd details below, an increase in costs of less than twenty per cent halved net income.

Herd	1953 £	1956 £	Difference *per cent*
Receipts . . .	9,037	9,042	+ 0·05
Costs . . .	6,554	7,789	+18·84
Net income . .	2,483	1,253	−49·54

The reason for the lack of success of the traditional herds is not far to seek, for in combining the moderate yield of the bulk feeders with the high costs of the high yielders, they display the weak but not the strong features of the other two systems. Thus their foods and grazing cost was 1*s*. 6*d*. per gallon, the same as that of the high-yield herds, while their yield per cow was 826 gallons, similar to the 815 gallons of the bulk-feed herds. Moderate yields and moderate costs, or high yields and high costs, are each capable of giving a fair return, but moderate yields and high costs are, economically, a fatal combination. Under these circumstances the question arises whether the traditional herd should turn towards the bulk-feed or the high-yield system.

Bulk feed versus high yield

Table 1 shows that the bulk-feed and high-yield systems made almost identical net incomes per cow and per acre. The means by which they were attained, however, differed considerably. The high yielders depended on intensive concentrate feeding to push the yield up to an average of 1,135 gallons a cow, whereas the bulk feeders, in obtaining 815 gallons a cow, made more use of grass and less of concentrates.

Table 2 gives details of the feeding practices. Compared with the bulk feeders, the high yielders fed an additional 27·6 cwt of concentrates per cow, 23·9 cwt of which were bought cakes and meals. Over the year, this was an extra concentrate input of 2·13 lb per gallon. On the other hand, the bulk feeders made a greater use of grass, not only by using an extra ¼ acre per cow, but by making better use of the acreage, their grazing yielding 45·9 cwt hay equivalent per acre compared with the 38·2 cwt in the high-yield system.

Table 2

Feeding Practices

	Traditional		Bulk-feed		High-yield	
CONCENTRATES						
Per cow	*cwt*		*cwt*		*cwt*	
Purchased proprietary cakes	9·8		6·6		17·5	
Purchased straight feeds	3·4		3·0		9·0	
Purchased dry beet pulp	3·9		0·5		7·5	
Home-grown concentrates	9·4		5·3		9·0	
	26·5		15·4		43·0	
Per gallon	3·59 *lb*		2·11 *lb*		4·24 *lb*	
BULK FOODS						
Per cow	*acres*		*acres*		*acres*	
Grazing	1·08		1·19		1·14	
Hay and silage	0·60		0·65		0·49	
Roots and green fodder	0·14	1·82	0·10	1·94	0·14	1·77
Cereals and Pulses		0·39		0·18		0·30
HOME-GROWN FOODS						
Cows only		2·21		2·12		2·07
Followers included		3·12		3·12		3·03
GRAZING USE						
Hay equivalent:	*cwt*		*cwt*		*cwt*	
Per acre	38·6		45·9		38·2	
Per cow	41·7		54·6		43·5	

From the national viewpoint, the relative merits of the two systems hinge on the value placed, for the purpose of producing milk, on land as opposed to capital invested in imported feedingstuffs. In producing a given quantity of milk, the ratio of cows that must be maintained is seven on the bulk-feed system compared with five on the high-yield system. Since seven bulk-feed cows require 14·8 acres and five high-yield cows only 10·3 acres, there is a saving of 4·5 acres in favour of the high-yield system. Offsetting this, however, is the requirement of the high-yield cows for an additional £90 worth of "imported" feed*. To put this another way, for every acre in cows, the high-yield system produces 547 gallons compared with only 385 gallons from the bulk-feed system. On the other hand, for every £10 spent on "imported" foods, the bulk-feed system produces 820 gallons as against only 356 gallons from the high-yield system. The high-yield system is thus land-intensive, and the bulk-feed system "imported"-feed-intensive. As some of the "imported" feed comes from dollar areas, it follows that if farm acres are regarded as being scarcer than dollars, the high-yield system is the better. If, however, it is dollars that are the scarcer, and official policy inclines to this view, then the bulk-feed system is to be preferred.

* The value of "imported" feed is imputed by excluding all those purchased foods known to have been produced either directly, or as by-products, in this country.

Bulk feed versus traditional

From the farmer's viewpoint, the bulk-feed system is likely to be regarded as the better answer to the problem of the traditional herd. In particular, the high yielders are very much specialists. Herd averages of 1,000 gallons and upwards (from *all* the cows) are not readily attained, but usually take many years of patient breeding and selection. If a farmer has the establishment of a high-yielding herd as a long-term objective, well and good, but to make the traditional system financially stable, immediate measures are needed. The remedy suggested by the bulk feeders is to keep costs some 8¼*d.* per gallon lower than the traditional system although producing about the same yield per cow and per acre. The relative contribution from bulky foods as opposed to concentrates played a major role in the achievement of this lower cost. The bulk feeders obtained 13 cwt more hay equivalent per cow by using a slightly larger acreage of more productive grazing. They also fed a greater quantity of hay and silage. This enabled them to cut down the acreage of home-grown cereals and to reduce the amount of bought concentrates, so that the total input of concentrates was 1½ lb per gallon less than in the traditional system (see Table 2). The financial effect of this substitution of bulk feed for concentrates was to reduce food costs by more than £15 a cow or 4*d.* per gallon, as is shown below.

	Traditional	Bulk-feed	Difference
Per gallon	*d.*	*d.*	*d.*
Grazing	2·58	3·52	+0·94
Other foods	15·57	10·26	−5·31
	18·15	13·78	−4·37
Per cow	*£ s.*	*£ s.*	*£ s.*
Grazing	8 18	11 18	+ 3 0
Other foods	53 10	34 16	−18 14
	62 8	46 14	−15 14

Furthermore, the fact that the bulk-feed system is less vulnerable to price change than the high-yield system, is likely to recommend it to the traditional herdsman. A ten per cent rise in costs while reducing the income per cow of the bulk feeders to £40 2*s.*, would cut that of the high yielders to £33 14*s.* Similarly, a ten per cent fall in price would result in a net income of £35 6*s.* for the bulk feeders, and only £28 18*s.* for the high yielders.

It is appreciated that there are snags in changing from the traditional to the bulk-feed system. Cows which have become used to milking mainly on concentrates may drop in yield when confronted with a bulkier ration. Better management of grazing is not learnt overnight, particularly in those cases where it has previously been neglected. However, it is imperative that improvements are made if the traditional herd is to hold its own, and the bulk feeders show that it is possible with fairly ordinary cows. At the same time, their method fits in closely with the Government's declared aim of substituting home-grown feed for imported concentrates, and does not add to the problem of overproduction.

Profit from Barley

A Farm Case Study

W. G. R. WEEKS, B.SC.,

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The returns from capital outlay on drying and storage equipment depend to a great extent on the farmer's efficiency, but also on the seasonal price fluctuations.

INTEREST in grain drying and storage facilities has been quickened by the great increase in combine harvesters over the period 1946–56. In January 1946 there were 3,200 combines in England and Wales, but by March 1956 the number had risen to 27,600—an increase of over 24,000! Although the area under cereals declined by some 384,000 acres between 1946 and 1956, an increasing number of farmers have thought it worth while to invest in combine harvesters. In 1946 there were 2,076 corn acres per combine, but by 1956 there was a potential of one combine to every 227 cereal acres in England and Wales, while the number of binders had dropped by 11,400 machines.

This increase in corn mechanization has many advantages in promoting substantial economies in the labour and speed of harvesting where there is sufficient acreage to warrant the use of combine methods, and a comparison of harvesting by binder and combine suggests that the smallest type of lift-cut, power-take-off machine would be economically justified at rather less than 30 acres of corn per year. The initial capital cost of the combine and equipment—about £1,700—might, however, prove to be the stumbling block, and it is here that the farmer with limited capital who contemplates buying a combine must be satisfied first that a better return could not be obtained from another source; for example, by higher crop or livestock production.

Although it is an advantage to combine large cereal acreages, this increase in mechanization has created big marketing problems through the tendency to unload grain on to markets immediately after harvest. With binder harvesting, this situation was avoided by storing in stack and threshing as needed during the ensuing months. The farmer bore the risk of loss or deterioration in storage and the delay in realizing the cash value of the grain.

With barley, sales are perhaps more concentrated during August-October, this seasonal peak in sales having become more evident since the war. It follows that the harvest rush of grain on to the market lowers prices. The farmer, alive to this problem, and with a large cereal acreage, has been, and is, investing in grain dryers and grain storage equipment; thus theoretically we should expect to see more orderly marketing. For wheat, there is a rise in the standard price from harvest to a peak in May and June. There is, therefore, an estimated gain of between £4 and £5 per ton by holding wheat until March-June, but with barley there is no fixed guarantee that the price will rise later in the season, and the barley grower is taking a gamble with the prospects of a later price rise if he stores his crop.

Choosing a grain drier

If the farmer wishes to store his grain for any length of time, he will have to dry it, because of the need to reduce moisture content to about 14 per cent. Already many farmers have bought drying equipment; the number of all types of drier increased from approximately 1,000 in 1946 to 6,500 in March 1956. The Cambridge Survey of the Economics of Grain Drying groups these driers under four main headings: (1) Continuous flow. (2) Ventilated bins. (3) Platform or in-sack driers. (4) Tray driers.

The farmer whose experiences form the basis of this article took the following points into consideration when selecting his continuous-type drier.

Advantages

1. The drying process is rapid—of considerable advantage during the wet harvest of 1956, when the grain had a high moisture content.
2. Running costs are low, oil being 11*s.* per ton.
3. The drying is visible, enabling the process to be kept under constant observation.
4. The grain is elevated straight from the drier to the silo.
5. If silos had not been installed it would have been possible to store on the barn floor, or directly sack, or pipe into hopper wagons for transport to the market.

Disadvantages

1. The high initial cost; the pre-cleaner, oil tank, motor, elevator, conveyor and drier cost £1,500, but with 220 acres of corn the farmer thought that this amount would be amply repaid by the surer and safer system.
2. The possible harm to germination properties by overheating.
3. The need for constant supervision: on this farm, where the drier worked round the clock and two men shared twelve hours on and twelve off, attention to mechanical parts precluded any breakdown.
4. The risk that with damp grain, (above 20 per cent moisture) the throughput of the drier can be the limiting factor; but on this farm, with two combines feeding, the provision of a large storage pit plus the night shift, prevented the drier capacity acting as a bottleneck, even though initial moisture was 21·5 per cent.

The farmer bought the continuous-type drier plus accessories and erected it with farm labour for £1,500. Eight stressed aluminium silos of 320 tons capacity, also built by farm labour, cost £2,500.

Cultivation, harvesting and drying costs

Management policy for the barley crop was as follows: 220 acres were ploughed once by diesel tractors hauling three-furrow ploughs, the land was disced and harrowed twice, thus ensuring the fine seedbed necessary for barley. Dressed home-grown seed was used at the rate of 1¼ cwt per acre. It was drilled with 3 cwt per acre of compound corn manure and the seedbed consolidated by smooth rolling. The open spring of 1956 allowed quick germination and, after a certain amount of growth, the crop was sprayed to check charlock and other weeds, so that the growth could get the full value of the drilled fertilizer.

These cultivations took 1,032 man- and 972 tractor-hours, for which the

cost was £425; to this must be added the cost of the 302 cwt of barley seed, 660 cwt of fertilizer, 138 gallons of spray, and the proprietary seed dressing —a total of £1,770. This was the sole amount incurred until harvest time.

Harvesting was by two 12-feet-cut, self-propelled, petrol-driven tanker combines bought in 1946. The boggy state of the ground and a tangled, wet crop were mainly responsible for a high rate of canvas breakage—reflected in the season's repair bill of £120. The time taken to harvest a given area was also adversely affected by these conditions, only three-quarters of an acre per hour being harvested by each machine: a reasonable figure is 1-2 acres per hour for each combine. The grain was passed from the combines to either high-bodied trucks or similar tractor-drawn trailers for the journey to the drier, and the straw was deposited in the wake of the machines. The straw was allowed to lie for a day or so before being turned, and then baled by a tractor-driven p.t.o. baler.

The harvest costs at this stage amounted to £368; but with additional materials, and wear and tear plus repairs to the combines and other machinery which would cause depreciation in the value of these expensive items, the harvest costs totalled £998. Added to this is the estimated rent of the 220 acres (£440) and a calculated share of general farm expenses, say £102, for work such as ditching and hedging. The final figure for cultivating and harvesting the barley crop was therefore £3,310. For this sum, 7,400 cwt of barley grain and 5,500 cwt barley straw were harvested from the 220 acres. All grain passed through the drier, but before the barley had been harvested. 30 tons of oats were dried. As the drier operated continuously day and night until all corn had been dried only an inclusive figure, £500, for drying both oats and barley was available. It was assumed that a given weight of oats cost the same to dry as a given weight of barley; hence the costs of drying and pre-cleaning 7,400 cwt of barley were £462 (that is, 1*s.* 3*d.* per cwt) with moisture reduced from 21·5 to 12·5 per cent. Production and drying of the barley can be summarized thus:

	£
Cultivation and harvesting	3,310
Drying	462
Total crop and drying costs	3,772

But this is for the whole crop, grain and straw. The direct cost of barley production is the important factor, and to obtain this, certain charges must be debited wholly against grain production and others against the straw. After these charges were calculated, it was found that the final cost of 7,400 cwt of dried barley was £3,262 (that is, 8*s.* 10*d.* a cwt), and that of 5,500 cwt of straw, £510 (1*s.* 9*d.* a cwt).

Depreciation: selling prices

The question of how much to debit the eight grain storage silos was open to a number of suggestions. Firstly, there is the depreciation on the silos. Secondly, should the earning potential of the £2,500 which they cost be taken into account? After all, if this sum were invested on the open market, a 4 per cent return should be possible! Then there is the question of the interest which would have accrued on the money now tied up in the stored grain and the loss which must occur in grain weight. Lastly, there are the costs of any

extra handling charges. After talking over these points with the farmer, it was decided, rightly or wrongly, to keep the cost down and to include only the charge most likely to occur, namely depreciation in the capital cost of the silos. This was reckoned as 10 per cent of £2,500.

Before the storage cost could be calculated, 1,000 cwt of dried barley were sold at 25*s.* per cwt. This was necessary because storage capacity was limited to 6,400 cwt. Storage costs will, then, only apply to this quantity of grain.

	£
Cost of 7,400 cwt dried barley	3,262
Less 1,000 cwt dried barley	441
	2,821
Add depreciation on silos	250
Cost of 6,400 cwt dried and stored barley	3,071

The cost of producing 1 cwt dried barley was 8*s.* 10*d.*, while the cost of this barley and storage charge was 9*s.* 10*d.*; storage cost was therefore 1*s.* per cwt.

As stated earlier, the farmer received 25*s.* per cwt for the 1,000 cwt sold ex-combine and drier, but, due to a combination of circumstances, the selling prices of the remaining grain were:

cwt	*s. d.*	£
4,000	@ 27 6	5,500
1,000	@ 23 6	1,175
1,400	@ 21 6	1,505

The average selling price of the stored barley was 25*s.* 7*d.* per cwt.

From the findings of this case study and under this set of circumstances, the farmer would have fared better financially if he could have sold more of the crop at 25*s.* ex-drier or 27*s.* 6*d.* ex-silo, both prices ruling earlier in the season. Of course, it is easy to be wise after the event, but as cost per cwt for storage was 1*s.* and the difference between harvest selling price and the average selling price of stored barley was 7*d.*, on the face of things, storage was not a great financial success. But this may not be true of another year and different circumstances.

Perhaps the most striking point is the production cost of the dried barley at 8*s.* 10*d.* per cwt. Fantastic? Maybe, but if the figures are to be believed, this is what one farmer did. Certainly a large acreage was grown and the cultivation and harvesting techniques were highly planned and mechanized, possibly to a greater degree than is feasible on smaller farms or smaller acreages. This farmer managed to produce barley cheaply by *planning* the whole operation. The fields were grouped together, work was planned so that one operation followed easily upon another, overtime was the rule rather than the exception, and the combines worked a 10- to 12-hour day when and wherever possible. Perhaps this farmer was fortunate in having suitable labour and equipment. He certainly had the flair for organizing his resources, this being very obvious in the way the drier was worked twenty-four hours a day, excluding Sundays, until all the grain had been dried and barley stored.

It can be argued that this is not a fair example, but what is a fair example? If other farms had provided figures, perhaps higher costs would have been found. But this case shows what can be, and indeed has been, done by one farmer on one farm.

Short Grass Silage

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Gang-mowing and ensiling short, leafy grass is giving higher yields on two Cheshire dairy farms.

A RELATIVELY new technique of grassland management and grass conservation is now in operation on several Cheshire farms. This system involves utilizing the grass at a short, nutritious stage not only for grazing, but also for conservation. A grazing, resting, mowing sequence is followed, while silage-making continues throughout the growing period. The aim is to produce the maximum amount of high-quality silage capable of maintaining a satisfactory level of diet and milk production without the need for expensive, high-protein concentrates. A gang-mower machine, as shown on p. iii of the art inset, cuts the grass at a height of 4–8 inches, throws the grass on to a conveyor chain and elevator and discharges it into a high-sided trailer.

Labour costs are relatively low under this system of silage-making; indeed it compares quite favourably with any other method of forage harvesting. Figures obtained by the National Institute of Agricultural Engineering from a time study carried out on four farms in 1956 showed the machine work rate to be from 4·1 to 17·4 tons per hour, moisture contents varying from 78 to 85 per cent, and work speeds from 4·2 to 7·1 miles per hour. In terms of cutting, loading and unloading, but excluding transport, the total man-minutes per ton varied from 20·9 to 43·5. The machine was not, of course, designed to deal with long material and is only really satisfactory with reasonably short grass.

The system at work

On two Cheshire farms where the short-grass silage system is in operation, accurate records of production have been kept and last year's results are interesting. Mr. E. S. Walley, who designed the mower-loader machine some years ago as a means of dealing with short grass on aerodromes which he was cutting under contract, has been making short-grass silage on his own farm, Tilstone Hall, Tarporley, for several years. The farm consists of 232 acres all under permanent grass or long leys. In the past a herd of 80 Canadian Holsteins and a considerable number of followers have been carried, but in early 1956 Mr. Walley gave up rearing. He bought 40 Ayrshire heifers in April and another 10 in the autumn, the average stocking being about 115 cows and heifers. The normal annual fertilizer dressing has been 3 cwt superphosphate and 1½ cwt muriate of potash per acre, applied in autumn. White clover flourishes under frequent cutting and, in the past, has been relied upon to supply the necessary nitrogen to feed the grasses. In future, however, Mr. Walley proposes to apply liquid pig manure which, it is estimated, will provide 80 lb nitrogen per acre in two dressings.

Silage is made in open pits which have, recently, been concreted. Trailers are emptied from the side of the pit and during filling, no consolidation is given other than the weight of one man spreading the loads. Instead of covering the whole floor area at once, the silos are filled from one end in short lengths. With young leafy grass occupying these short, deep sections, the problem of overheating does not arise and Mr. Walley has found by trial and error that under this system, excellent silage can be made without any vehicle running over the mass during the filling process. Sealing off is done by trampling to form a skin which seals the silage and results in negligible top waste.

As most of the cows are housed in shippons and the remainder are yarded, silage has to be carted to them during the winter months. Short-grass silage is, however, easy to handle and, after a cut has been made about a yard back from the face of the pit, a fore-end loader is used to take out the silage in blocks. Up to 140 lb of silage per head, per day, have been fed in the past, but with silage containing 20–30 per cent crude protein, this was considered rather wasteful and the present ration is approximately 75–80 lb silage plus 4 lb of beet pulp with minerals for maintenance and the first 2½–3 gallons. Dairy cake or meal is used for all subsequent production, although cereals would probably be equally satisfactory for all but very heavy-yielding cows. The fibre content of this type of silage is very low and therefore purchased straw is supplied *ad lib*.

Accurate records of field production in terms of cow-grazing-days, milk production and grass conserved were kept during the 1956 grazing season. Approximately 640 tons of silage were made from the 438 acres cut—that is, an average of 1·5 tons per cut acre. In addition to maintenance, 36,000 gallons of milk were produced on the farm's grass, achieving an average of 19·2 cwt of utilized starch equivalent per acre.

During the twelve months ended 31 March, 1957, 76,658 gallons of milk were sold off the farm with a purchased-feed consumption of 1·68 lb per gallon, which amounts to 10 cwt per cow. For the winter period, November–March, purchased-feed consumption amounted to 2·7 lb per gallon, of which 1·1 lb was dried sugar beet pulp.

A second example

Another example comes from Mr. P. M. Carr, who took over Pigeon House Farm, Handley, in the spring of 1955. During the ensuing summer the farm was stocked with in-calf heifers, mainly Ayrshires. All the effective farm acreage is under grass and most of the 153 acres concerned have now been reseeded. Approximately 100 head of milking stock are carried and no young stock is reared. A short-grass silage system has been adopted, grassland management is intensive and fertilizer consumption high. The fertilizers applied in 1956 averaged 179 lb nitrogen, 35 lb phosphoric acid, and 70 lb potassium oxide per acre, in addition to which a total of 77 tons of lime were applied. Under this system of management, production from some of the old permanent grassland has been surprisingly high and almost equals the best leys. This will be seen from the records of individual fields shown in the following table:

		Utilized starch equivalent		
		Grazing	Silage	Total
SECOND-YEAR LEY	*acres*	*cwt*	*cwt*	*cwt*
Middle field	12¼	19·0	9·1	28·1
Aldersey Lane III	8½	15·8	11·2	27·0
PERMANENT GRASS				
Drive field	23	13·0	14·2	27·2
House paddock	5½	19·2	7·8	27·0
Brook field	7	13·8	12·1	25·9

A total of 525 tons of silage was made, giving an overall average of 23·8 cwt per acre of utilized starch equivalent. Considering the fertilizer usage, these figures are not high, but the spring and early summer of 1956 did not give good growing conditions, and over one-quarter of the farm had been reseeded.

As the farm is run by Mr. Carr himself with only two men, silage-making is not surprisingly almost a one-man operation, although some help in levelling is given at the silo. A long, surface clamp on a concrete base is used and the grass is carried in three-way tipping trailers. The silage is made in sections which, however, are much longer than those at Tilstone Hall Farm, so that the depth of grass at each filling is less. Consequently, it is possible to draw the trailers over the clamp and retain sufficient heat to make good silage. About one gallon of molasses is used to a ton of grass. Tracks are laid over each section to carry the trailers, and as each section is completed, the tracks are moved forward and the section sealed off with lime. Stock are strip-grazed for as long a period as possible; in 1956 this amounted to 237 grazing days—from the end of March to late autumn. In winter, the animals are yarded and silage is self-fed in sections, about 9 inches of feeding face being allowed per head. In summer, the cows receive only a small quantity of beet pulp plus minerals; in winter, in addition to silage (about 100–112 lb per head, per day) and straw (about 2 lb per head, per day), 3 lb per cow, per day, of a starchy concentrate mixture plus minerals is fed in the milking parlour. The mixture consists of 1 part beet pulp, 1 part barley meal, 1 part proprietary molassed brewers' grains compound.

Mr. Carr is co-operating with I.C.I. in their farm costing scheme and, in his first full-costed year ended 23 November, 1956, he produced 63,452 gallons of milk from an average of 98 heifers in their first lactation. Food consumption was as follows:

	cwt per cow	
Concentrates	5·8	
Hay	2·3	(fed when silage was running short)
Straw	2·3	
Silage	106·7	

Concentrates fed per gallon of milk produced, amounted to 0·9 lb (1·7 lb in winter and 0·6 lb in summer).

It is realized that this short-grass system will not suit every dairy farm and that under other systems of silage-making considerable savings in purchased feed can be attained. On the two farms quoted, milk yields per cow

are not high, mainly because of a high proportion of heifers, but both farmers are already obtaining higher yields and should do better in the future. It is however apparent from the preliminary records that high output from grass can be achieved under a relatively close cutting system and that this can be linked with a high labour efficiency. By obtaining a high-quality product—something akin to spring grazing for all-the-year-round feeding—the need for expensive high protein purchased food is virtually eliminated. Grassland generally, and permanent grass in particular, is improved by a gang-mowing, resting and grazing rota; the sward itself is quickly thickened, and frequent cutting gives perennial weeds little chance of survival.

Economic Use of the Kale Crop

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Such a high-yielding, proteinous forage crop as kale ought not to be wasted by a poor grazing technique.

IT is generally agreed that the most economical way of utilizing the kale crop is by cutting and carting in the traditional manner, but it is also recognized that under most farm conditions the method is too costly; indeed, it is often impossible because of the shortage of labour. The main alternative is grazing, but this has the great disadvantage of a high degree of wastage. The grazing animal can be controlled to some extent, but effectiveness depends on the skill and efficiency of the grazier.

A survey was carried out in the Aberystwyth area in the winter feeding periods of 1955–56 and 1956–57 to obtain information on the amount of crop wastage which resulted from the various systems of kale harvesting, and also to determine, if possible, the most suitable method of utilizing the crop by means of the grazing animal. In each winter, seventeen crops were sampled for yield and, after utilization, for wastage. The quantity of waste was calculated on the dry matter and crude protein of the crop because in most cases the fresh material was too badly contaminated with soil and faeces for the tests to be carried out satisfactorily. The results are shown in Table 1 (opposite) and confirm that the most efficient method of utilization is by cutting and carting. The loss figure (5·56 per cent) under this system does not take into consideration any subsequent wastage during feeding, but it so happened that on the three farms concerned in this part of the survey there was rarely enough kale cut and carted to satisfy the appetite of the stock and the quantity of waste was therefore small. It seems, however, that the advantage of low *crop* wastage is outweighed by the demands on labour and other considerations. Thus the popularity of the system is likely to wane.

Table 1

Influence of harvesting method on crop wastage

No. of crops	Harvesting method	YIELD				LOSS				UTILIZED	
		Green weight	Dry matter	Crude protein	Leaf/stem ratio D.M. basis	Dry matter		Crude protein		Dry matter	Crude protein
		tons/acre	*tons/acre*	*cwt/acre*		*tons/acre*	*per cent*	*cwt/acre*	*per cent*	*tons/acre*	*cwt/acre*
3	Cut and carted	20·99	3·42	11·74	1·44	0·19	5·56	0·62	5·28	3·23	11·12
21	Grazed, 1–2 rows	18.09	2·82	7·98	0·89	0·40	14·18	1·01	12·66	2·42	6·97
4	Grazed, 3+rows	19·69	3·03	9·40	0·76	0·85	28·05	2·49	26·49	2·18	6·91
6	Grazed, 2–4 yards (broadcast crops)	9·90	1·60	5·10	1·75	0·31	19·38	0·87	17·06	1·29	4·23

Table 2

Utilization of marrowstem and thousandhead kale

	Green weight	Dry matter	Crude protein	Leaf/stem ratio D.M. basis	Dry matter			Crude protein		
					Waste	Loss	Utilized	Waste	Loss	Utilized
	tons/acre	*tons/acre*	*cwt/acre*		*tons/acre*	*per cent*	*tons/acre*	*cwt/acre*	*per cent*	*cwt/acre*
Marrowstem (26 crops) .	17·06	2·67	7·36	0·96	0·46	17·23	2·21	1·16	15·76	6·20
Thousandhead (8 crops) .	17·22	2·74	9·98	1·46	0·30	10·95	2·44	1·05	10·52	8·92

Importance of the electric fence

The harvesting method adopted most widely was grazing. Several variations of the system were found, and of these, two which made use of an electric fence, predominated. In the one case, the position of the fence allowed access to one row, or at the most, two rows of kale; in the other, to three or more rows.

The one/two row grazing sometimes entailed moving the fence twice a day, but the consequent reduction in wastage was held to justify the extra labour involved. In both winters this system proved to be the least wasteful of the grazing systems, the overall mean wastage figure being 14·18 per cent dry matter and 12·66 per cent crude protein (Table 1). The variation in wastage figures from farm to farm ranged from 7 to 22 per cent and appeared to be due to the following causes:

1. *Weather:* under wet conditions, any material which fell to earth quickly became waste because it was soon fouled with mud and faeces. In dry weather, much of this "waste" would, of course, be eaten subsequently.
2. *The behaviour of the cattle:* on some farms excessive bullying led to a higher proportion of wastage due to trampling, and cattle breaking through the fence caused considerable crop damage. Many remedies, including wiring the horns and dehorning, were tried, but none proved completely effective. However, the use of barbed wire in the electric fence appeared to offer a possible solution to the problem, although it made the setting up of the fence more difficult.
3. *The position of the fence:* this had to be immediately in front of the crop because a between-rows position, which allowed greater access to the second row, also led to increased wastage.
4. *Yield of the crop:* in both winters there was a tendency for the larger crops to give rise to a slightly higher percentage of waste material.
5. *Frontage per animal:* where the percentage of waste material was high, it invariably coincided with too great a frontage being allowed per animal. The grazing areas were not fully utilized before the fence was moved. The actual frontage allowed should depend on whether the animals are horned and the yield of the crop.

Grazing by allowing access to three or more rows at a time was the least favoured of the grazing systems. The fence was placed in the crop, a pathway was, in some cases, cut for it, and the stock were thus permitted to walk into the kale and cause considerable damage. Waste material amounted to some 28 per cent of the dry matter, and 26·5 per cent of the crude protein. This method was usually adopted only where a considerable cattle population necessitated a fairly large area of kale per day, or where some attempt was made to save labour by moving the fence at intervals of several days.

The final system surveyed was strip grazing of broadcast crops. This gave a wastage figure of about 19–20 per cent of the dry matter, and 17 per cent of the crude protein. A 2–4-yard strip was allowed; occasionally a wider strip was used for several days. The cattle were allowed to reach under the fence for a large proportion of the crop, and this reduced wastage by trampling. The fence ran the length or breadth of the field, depending on the cattle population.

The leafy (high protein) part of the crop was utilized more efficiently than the stem (low protein).

Thousandhead excels

There were few complaints in the first winter that the crops, whether thousandhead or marrowstem, were difficult to manage or that they influenced either the position of the electric fence or the work involved in moving it. This was because the dry summer of 1955 resulted in short-growing crops and the need to trim the tops of the plants or to cut channels for the fence did not arise. In 1956–57, however, the height of the marrowstem crops, and to a less degree of the thousandhead, caused some difficulty.

For a comparison of the utilization of the two types of kale under all systems for the two years, see Table 2 on p. 387. In the survey, thousandhead proved superior to marrowstem both in crop yield and the amount of dry matter and crude protein utilized. It also gave much more leafy material, which is preferable for the grazing animal. One or two crops of Canson kale were grown, but they were in no way superior to thousandhead kale.

From the results of the survey it is suggested that, under a system of grazing, wastage of kale is kept to a minimum if (a) one row, or at most two rows, are allowed per grazing, (b) the placing of the fence is such that it prevents cattle standing on the ungrazed crops, and (c) the frontage allowance per animal is gauged bearing in mind the crop yield and whether the cattle are horned. Under most farm conditions, thousandhead kale is likely to prove superior to marrowstem.

Although the survey was not concerned with the amount of wastage resulting from opening up the crop, considerable waste did occur during this period. The crops were not usually approached from open ground, so that the fence had to be set up some distance into the crop. Opening up should be by cutting and carting: either by cutting a strip of crop the length of the electric fence, or by cutting out a block and then setting the fence up around the area. One advantage of this method is that when the cattle are moving from pasture to kale, the kale can be introduced gradually into the diet.

Grateful acknowledgment is made to Professor W. Ellison and to the farmers who assisted in the survey.

★ NEXT MONTH ★

Some articles of outstanding interest

QUALITY ASPECTS OF EGG MARKETING *by N. R. Knowles*

EARLY WEANING OF CALVES *by T. R. Preston*

IN TIME OF FARROWING *by K. G. Mitchell*

WORLD FOOD AND POPULATION *by G. Ordish*

Rosemaund

E. L. JONES, M.SC., N.D.A.,
Director

ROSEMAUND is situated in east central Herefordshire, isolated from main roads and railways, within the triangle formed by the city of Hereford to the south and the market towns of Leominster to the north-west and Bromyard to the north-east. The farm, which extends to 430 acres of this undulating countryside, lies between 250 and 350 feet above sea level, and slopes as much as one in eight are encountered on some of the cultivated land. Herefordshire lies in the "rain shadow" of the Welsh uplands so that, despite its westerly situation, the rainfall at Rosemaund is comparatively small, averaging less than 26 inches in the past six years.

The farm is typical of much of the heavy land of north-east Herefordshire and parts of Worcestershire and is farmed primarily for hops with other tillage crops, some fruit—mainly old cider apples in grass orcharding—and with cattle raising as the main livestock enterprise. Like most farms in the district, it has several small acreages of mixed coppice and woodland on the shallower soils over marl or on poorly-drained ground around springs. The soils are derived from the red marls of the Downtonian series of the Old Red Sandstone but, due to differences in depth, texture and drainage, are agriculturally far from uniform. The red marls contain thin beds of soft micaceous sandstone which come near the surface in places, and a band of dark sandstone outcrops in one field. The greater part of the farm is heavy land—clay loam or clay—stoneless and up to two feet or more in depth, but much of it is imperfectly drained. Unfortunately, owing to their fine silt and sand fractions, these soils do not lend themselves to effective mole drainage. Rosemaund did not come within the comprehensive drainage systems which were laid down on several neighbouring farms in the latter half of the nineteenth century, but in recent times some tile drainage has improved the more waterlogged areas. Under good drainage and in well-established grass the top nine inches of the soil profile has a normal crumb structure, but this is poorly developed in the shallower soils, in tillage fields when continuously cropped and, most notably, on the sites of old hop-yards.

At the outbreak of the Second World War most of the farm, apart from the hop-yards, was still in old grass and there were still some fields with bracken and bush where hounds could usually rely on finding a fox. From 1940 onwards some old orcharding and many of the hedges and trees were grubbed out. In all, some three miles of hedges were removed, thereby halving the number of enclosures and increasing the average size to over twenty acres, rather larger than is common in this district. With the exception only of the old grass orcharding and fields adjoining the buildings, the enlarged enclosures were ploughed and heavily cropped with cereals interspersed with some leys, mainly one-year mixtures of red clover and ryegrass. Throughout the period the grazing of well-bred cattle to produce forward stores—Herefords and Hereford crosses—was the main livestock enterprise.

Hops—the key crop

When the farm was taken over in 1950 it was decided to retain the hop acreage entirely for experimental purposes. Hops are the key crop in the farm's organization, and in most years they account for more than half of the gross income. About 60 acres of the deeper soils in the more sheltered situations are reserved primarily for this crop, although only 35 acres or so will be in hops at any one time. The hop plant is a long-lived perennial, but the economic life of commercial hop-yards is variable, depending mainly on the incidence of various diseases. Some hop-yards are grubbed after less than twenty-five years, but others remain productive for more than double that term. The 39 acres of Rosemaund hops taken over in 1950 were all infected with "nettlehead" virus, which precluded their use for experimental purposes, and the entire acreage was grubbed. It was replaced by the 35 acres of young hops, mainly clone "N" Fuggles, which are now coming into full bearing; part of the acreage used was virgin hopland and the other had been rested from hops, some of it since the early years of the century. This major undertaking, including provision of permanent poles and wire-work—a small forest of poles and some 86 miles of wire were required, to say nothing of the 450 miles of Indian coconut fibre twine used annually for stringing and training, —was phased over five years so that the output of hops would not be seriously reduced in the transition period. As each hop-yard comes into production, the experimental programme is extended.

The first series of experiments is concerned mainly with husbandry problems, but also includes a trial of the "new" Wye varieties of hops, few of which have been grown on the old Red Sandstone of the West Midlands. Most of these experiments were laid down in 1952, and a progress report on the trends so far observable is being prepared for circulation to growers.

The second series of hop experiments is to test some new methods of growing and harvesting and their effects on the yield and quality of the crop. Various departures from traditional tillage practice have been attempted on a small scale by growers, and at Rosemaund satisfactory crops were grown for three successive years after sowing down an established hop-yard to grass. A long-term comparison (in a newly-established hop-yard) of production under three different kinds of sown sward and under traditional tillage cultivations had to be abandoned recently, when an outbreak of progressive verticillium wilt was found in the experimental area. This was the first known case in the West Midlands' hop-growing area. Although affected plants occurred only in one part of the experiment, it was considered advisable to destroy the whole hop-yard as one of the measures to prevent the disease spreading.

Cutting of hop bines at picking time is believed to diminish the vigour of the parent rootstock and thus reduce subsequent cropping capacity. (The present trend towards mechanization of the hop harvest involves cutting and carting of all bines to large, stationary machines.) An experiment is therefore being designed to test what is the cumulative effect of severing the bines in early, mid and late season on the yield of hops in subsequent years and in comparison with the yields obtained following hand-picking.

The whole ripe hop, as required by the brewers, is in prime condition for only a short period but harvesting in practice, whether by hand or machine,

usually extends over several weeks. Various strains of the widely-grown Fuggle hop are therefore being tested to provide a succession suitable for harvesting in good order throughout the picking season.

The livestock

Hops respond to generous applications of farmyard manure. The cattle enterprise is therefore important on hop farms for this purpose as well as in its own right, and beef cattle are almost always kept. At Rosemaund the greater part of the cattle stock is at present devoted to a "beef from dairy herds" experiment. Bull calves of the British Friesian and Dairy Shorthorn breeds and of their crosses with the colour-marking Hereford and Angus bulls are reared under a multiple suckling system. Latterly, Ayrshires and Ayrshire crosses, including the cross with the Beef Shorthorn, have also been reared under the same system. The calves, all autumn born, are reared under similar conditions on a high plane of nutrition in early life. Thereafter the cattle are maintained at a moderate level of nutrition, mainly on home-grown feedingstuffs and at grass until finally fattened for slaughter. A first progress report on this experiment has been published elsewhere.* A small herd of pure-bred Hereford cows is also kept, rearing their calves by the single suckling system. The "beef from dairy herds" experiment is to be followed by a scheme of performance recording and progeny testing of beef bulls.

Winter feeding is a costly item in beef production, but weather and soil conditions at Rosemaund preclude economies on any large scale by way of "early bite", planned "foggage" or out-wintering. Most of the cattle are housed and for bulky fodders rely mainly on silage supplemented by some hay and mangolds. Silage is less commonly used in the beef than in the dairy herds, and experiments are in progress comparing it with hay and roots both for the wintering of yearling stores and the fattening of two-year-old cattle. The grassland potential of ley farming is thus used at Rosemaund for increased summer stocking and for conservation for winter feeding in yards rather more than for extending the grazing season.

Sheep had not been kept at Rosemaund for many years before 1950, but present policy is to maintain a breeding flock of about a hundred ewes in which Clun and Kerry types are represented as well as Scotch and Welsh half-breds. The ewes are mated to Suffolk rams and are being used for a "flushing" experiment to compare results from different pasturage treatments prior to and during the tupping season.

The introduction of sheep poses the question of intensity of stocking and the cattle-sheep ratio most suitable for this stock-raising farm. So complex a problem is not wholly capable of investigation within precise experimental designs but, despite obvious limitations, it is hoped that useful observations and some data may be accumulated from a long-term trial starting this year. Two levels of set cattle stocking alone are to be compared with the same rates of cattle stocking supplemented by two levels of sheep stocking. Store cattle and ewes with lambs will be used to assess production in terms of liveweight gains.

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* A Comparison of Different Breeds and Crosses for Beef Production. E. L. Jones and G. K. Rennie. *Exp. Husb.*, 1956, 1, 48–57.

Ley farming

Something of a counterpart to the previous experiment is the "ley fertility" experiment, designed primarily to measure the effects on soil fertility of leys of different durations and composition and subject to different forms of management.

Each of the "treatment" leys is followed by a common "testing" rotation of potatoes, wheat and barley. The trial as a whole is being carried out at two levels of nitrogenous manuring and will continue over a long term to test the cumulative effects of the various leys and their managements.

The arable side of the ley farming system provides cash crops with stock feed by-products. Winter cereals (both wheat and oats) have proved reliable crops but winter barley, after several years of disappointing yields, has been discontinued. Winter beans are moderately reliable but average rather less than 25 cwt per acre over the years. Vining peas are being tried and, if successful, could replace the beans in the rotation. Spring cereals are less certain, sowing often being much delayed in unfavourable years, and never early in the best of seasons. Spring oats are most seriously affected by late sowings and suffer invariably from attacks of frit fly; in common with local experience, this crop has proved too disappointing to include in the rotation. On the other hand, the more recently introduced varieties of spring wheats and barleys have yielded well. In conjunction with the National Institute of Agricultural Botany, primary variety trials of winter and spring wheats, winter oats, winter beans, spring barleys and potatoes have been conducted each year—in addition to observation plots of other crops, including fodder beet, mangolds, kale and rape—Rosemaund being the only centre available for testing new crop varieties on the old Red Sandstone formation. Facilities have now been extended for the establishment of a N.I.A.B. Regional Trials Centre at Rosemaund, beginning with 1957–58 sowings for next year's harvest.

Cider orcharding

One other crop, cider fruit, although not within the rotational scheme, must be mentioned. The old Red Sandstone produces trees of enormous size and considerable age. Most of the existing orcharding is about eighty years old and still productive, but there are now some gaps and not all of the trees remaining are good cider varieties. The old orcharding is therefore being grubbed in stages, and six acres of the cleared land now in tillage is due to be planted back to standard trees of recommended cider fruit varieties this autumn and later grassed down so that it will be available for grazing and, in time, for shelter. It is intended to use the new orchard for an experiment on the mulching and manuring of young trees. Looking further ahead, a trial is being planned in conjunction with the Long Ashton Research Station to test, under grass-orcharding conditions, a range of cider fruit varieties which, although they have shown promise elsewhere, have so far been grown little, if at all, in the West Midlands.

Capital development

Some reference is necessary to the programme of capital improvements. Rosemaund, like most of the farms in the district, was not equipped with buildings suitable for dealing with a sustained increase in production and, in addition special facilities were required for the handling of the crops, particularly the hops, and of the livestock in experiments. The capital improvements—made or planned and in addition to the replacement of the old hop-yards already mentioned—include new hop kilns and equipment, cattle yards and barns, grain drying and storage, laboratory facilities and housing for staff. In the fields the water supply system has been supplemented and extended for hop spraying and to provide a piped supply to each enclosure, thus eliminating pools and the open stream as watering places. New roads and fences have been made and tile drainage is being put in where necessary. The magnitude of the capital investment involved, after due allowance is made for the special requirements for experimental work, is a timely reminder of the problems facing farming, if it is to maintain an expanded production at competitive costs.

The seven-year term thus far required for the equipment of the farm and the laying down of major, long-term experiment marks the end of a phase. The steadily growing stream of visitors begins now to see the first results from work in progress embodied in a farm plan which owes much to the inspiration of the Chairman of the Farm Advisory Committee, Mr. A. J. Parker, O.B.E., and his committee members. It is fitting to conclude by paying tribute to their lively interest and unfailing guidance in the development of the farm, and to the technical, office and farm staff for their enthusiastic support and team work in the execution of the plans and policies involved.

The London Dairy Show

October 22-25

SURELY the one outstanding impression which the average visitor to the London Dairy Show came away with must have been the enormous amount of capital invested in the process of getting milk from udder to user. It is a far cry from the picturesque placidities of a pastoral life, when demure milkmaids coaxed meagre yields from their reluctant charges, to the massive, streamlined dairy industry of today. In the blue-grey setting of Olympia the racket of demonstrating machines is an immediate assault on the ears; but it is equally a joy to the eye for the evidence of efficiency and hygiene which it furnishes and, by implication, the progress of dairy research and engineering. Giant bottle washing and filling machines, aluminium cappers with running speeds of over 300 a minute, coolers, automatic craters and de-craters, pasteurizers, homogenizers, refrigerators, separators, delivery vans and

gadgets galore—all reflect an increasing awareness of the economies which automation can bring to every branch of our dairy industry, so saving manpower and reducing fatigue. An electronic machine which scans milk bottles after washing and automatically rejects any containing the smallest specks of foreign matter or broken glass attracted a lot of attention.

At the far end of the hall, complacent and unimpressed by the furore of commercial interest in the aisles, were this year's contenders for the dairy cattle honours—the symbolical source, as it were, of the 1,850 million gallons of milk which flowed from the pastures of England and Wales last year. Of the 285 cattle presented, British Friesians were in strongest force (70), Ayrshires (53), Dairy Shorthorns (37), Guernseys (36), Jerseys (32) and Red Polls (29). But in the inter-breed competitions it was the Ayrshires who claimed most of the limelight. The six-year-old Ayrshire "Snowshill Nonny", shown by Mr. John Bourne of Snowshill, Moreton-in-Marsh, Glos, was declared Supreme Champion. A team of Ayrshires also carried of the Bledisloe Trophy for the third year running, although the Friesians were only 6·8 points behind. The Ayrshires also collected the Coronation Cup and the special prize for the best dehorned animal.

A record number of nineteen animals competed for the Buckhurst Challenge Cup, which is awarded for the greatest number of points taking account of milk and butterfat production over three successive lactations, live weight and inspection. "Polperro", a Jersey cow owned by Mr. and Mrs. Lloyd-Jones of Uckfield, Sussex, repeated her success of last year, so making this the eighth time in nine years that the trophy has been won by the Jersey breed. In her last three lactations "Polperro" has yielded 15,022 lb at 5·95 B.F., 18,110 at 5·74 and 16,641 at 6·76. The Cup was presented to Mrs. Lloyd-Jones by the Duke of Edinburgh who, though he had only just returned from the royal tour in Canada and the United States, spent over four hours at the Show on the second day, watching the judging and displaying all his usual zest and keen, knowledgeable interest.

Among so many other fields of interest to claim time and attention, special mention must be made of the excellent farm cheese entries. All credit to the English Country Cheese Council for the success which is attending its lively efforts to put first-quality English cheeses back on the map and the menu. Prepacking, in which the ordinary housewife is taking an increasing interest, was a featured demonstration on their stand.

But the "biggest venture" was undoubtedly the two Dunlop cheeses manufactured at the Scottish M.M.B.'s Mauchline Creamery in Ayrshire. Each was 2½ feet high, 4 feet in diameter and weighed some 1,300 lb. More than 5,000 gallons of milk were used in their manufacture, and each was kept in its mould for seven days under a pressure of 25 tons. It is not suggested that these mammoth cheeses should become a regular commercial item, but it is hoped that they will help to stimulate the sale of Dunlop, which is to be packed in tartan polythene wrapping—an honour that has not so far been accorded even to the haggis!

S.R.O'H.

CORRECTION: *Food and Farming in Japan.* On page 350 of the October, 1957 issue, the last sentence of the fifth paragraph should read "There is, however, little double-cropping of rice, as the winters are too cold to make this worth while, except in the extreme south."

Home Wintering of Hill Sheep

ALBERT J. DAVIES, B.SC. and JOHN W. HIBLER, B.SC.
National Agricultural Advisory Service

Wintering hill sheep in the lowlands is becoming more costly each year and flockmasters must consider alternative systems of maintaining their animals during the lean months. Experiments on foggage grazing have given promising results.

THE custom of sending ewe lambs from hill farms to lowland areas for wintering is an old one, and its continuance is presumably an indication of its worth. The system not only relieves the strain of wintering on a hill farm and allows more stock to be carried, but on good lowland farms usually provides a nutritional level high enough to support normal growth and development. What is a reasonable nutrition level for a hill ewe lamb? Information on this point is scanty, but investigational work carried out at the University College of North Wales[1] suggests that there is a correlation between the liveweight gain of the ewe lamb during the winter and fertility in the first breeding season. It is contended that in most years a liveweight gain of 6 lb or more per lamb during wintering is desirable; loss in weight or only slight gain usually results in a higher percentage of barren shearling ewes. Also, well-wintered lambs can produce ½–1 lb more wool per head than poorly-wintered lambs.

The problem of finding suitable wintering for hill ewe lambs is becoming more difficult in all the upland areas of Wales. With the increasing importance of milk production on lowland farms in Wales, the more progressive farmers have realized that winter stocking with hill lambs is incompatible with milk production from grass. Emphasis on arable cropping during the war years reduced the area of grass for wintering, and more attractive prices for livestock products have encouraged heavier stocking on lowland farms. These factors have put the man who still takes in hill sheep in a strong bargaining position. Wintering prices on lowland farms have risen from 8–9*s.* per head in the late 1930s, to 24–30*s.* for the 1955–56 season; the cost of transport to and from the hill farm is also borne by the flockmaster. It is not surprising therefore that some hill farmers are exploring the possibilities of wintering lambs at home.

Home-wintering experiments

At this stage it may be useful to give the results of some experiments which seem to indicate that home wintering on foggage could be a promising

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Some form of rationing is essential to make the best use of winter grass. Here, in-lamb ewes are moving on to a new foggage break, leaving the previous plot well eaten down. (*Inset*) Sixteen inches of lush growth in January, which needs no labour to cut and cart.
(Photo: *Farmer and Stock-Breeder.*)

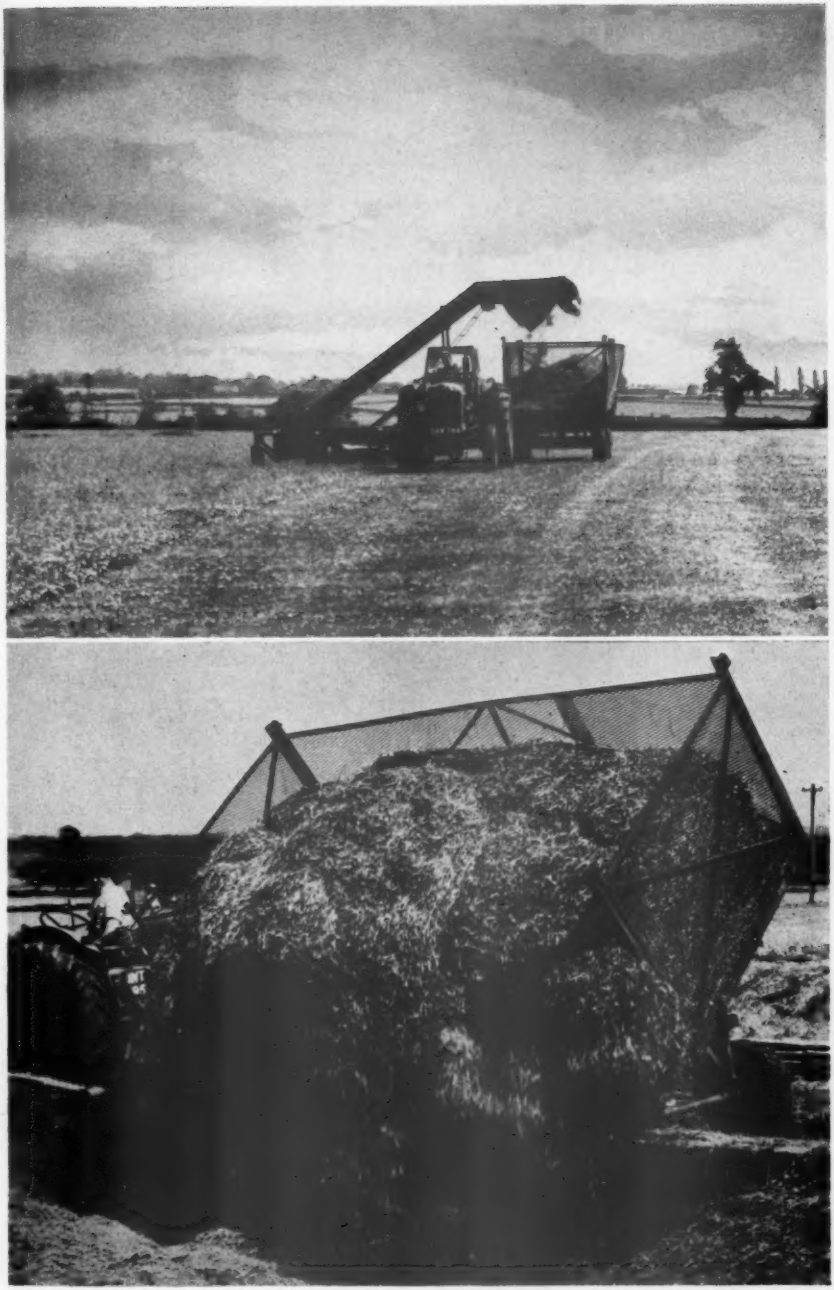
Sheep Breeding in Israel (Article on pp. 400–3)

Photos: *K. L. Richards*

Three ewes on a collective farm, showing remarkable udder development.

Five-year-old Awassi ram at the Sarid Settlement.

Short Grass Silage (Article on pp. 383–6)



A gang-mower machine cuts the grass at a height of 4–8 inches, throws it on to a conveyor chain and elevator and discharges it into a high-sided trailer.

The cut grass is tipped into the silo pit.

proposition on suitable hill farms. Throughout experiments undertaken during 1937–39 (under the Cahn Hill Improvement Scheme)[2] with several groups of ewes, those fed on winter foggage gave the most consistent liveweight increases. They also reared more lambs per live birth, and the average liveweight increase of their lambs from birth to weaning was higher than that of any of the other groups. Investigations at Glensaugh, the experimental hill farm of the North of Scotland Agricultural College[3] also showed that ewe lambs wintered on reseeded hill pasture did as well as those wintered away on lowland farms.

Further experiments were carried out in mid-Wales between 1953 and 1956 to find out whether the home-wintering practice could be developed on ordinary hill farms in the area; the following techniques were adopted at the three experimental centres concerned. The lambs used were of the Welsh mountain type with some Cheviot blood. They were divided at random into two groups. At the first centre, one group (eighty lambs) was sent to a lowland farm on September 30, 1953, and returned on April 1, 1954; on these dates, thirty of the group were selected at random and weighed. Another group (fifty lambs) was wintered at home; twenty-five of these were chosen at random and weighed on the same dates as the away-wintered animals. The home group remained on the hill until November 30 and then went on to foggage. To provide this foggage, 10 acres of ley, in which cocksfoot was dominant, had been grazed during August and closed on September 1 when a dressing of 2 cwt compound fertilizer (12 per cent nitrogen, 12 per cent phosphoric acid and 15 per cent potassium oxide) was given. Grazing by the lambs began on December 1. The area was fenced off into paddocks of 1¼–1½ acres, which were grazed in turn for an average of eighteen days; daily grazing time on the paddock was limited to between six and eight hours, after which the lambs were turned out on to an adjacent bare, permanent pasture.

The results of the experiments are shown in the following table:

	Hill ewe lambs wintered on foggage Live weight (*lb*)			Hill ewe lambs wintered away Live weight (*lb*)		
	Sept.	April	Gain or loss	Sept.	April	Gain or loss
1953–54	52	65	+13	55¼	49¼	−6¼
1954–55	46¼	55	+ 8¼	47¼	48¼	+1
1955–56	66	68¼	+ 2¼	67¼	63	−4¼

At all centres the lambs wintering at home on foggage made a much greater liveweight gain than those wintered away. Apart from the difference in weight, the appearance and "tone" of the wool of the home-wintered animals were decidedly better than that of the other group. Over the three winters, 5·7 per cent of the ewe lambs wintered away died, whereas only 2·1 per cent of those grazing the foggage failed to survive the winter.

Rosemaund Experimental Husbandry Farm (Article on pp. 390–4)

Rosemaund was taken over as a N.A.A.S. Experimental Farm in 1950. The existing hop acreage was kept for experimental purposes and hops are now the key crop in the farm's organization. In addition to the provision of new poles and wire for the entire growing crop, new kilns (shown opposite) were built for the drying of the harvested hops.

(Photo : *W. H. Bustin and Son*

On the farm where the trial was carried out in 1953–54, it is the practice to run a ram with the ewe lambs. Twenty-three (46 per cent) of the home-wintered group and eleven (14 per cent) of the away-wintered group lambed between April and June. This factor is reflected in the disparity in the weight figures at this centre.

The results obtained on foggage in 1954–55 are particularly interesting because of the severe weather conditions during that winter. Rainfall was heaviest during autumn and early winter, and later there were heavy falls of snow. The rainfall from October to April was 60 inches. Temperatures were quite high during the early part of the season but dropped rapidly in January and remained at a low level for several weeks.

In 1953–54 and 1955–56 the foggage fields were sown with a Cockle Park type mixture; the sward used in 1954–55 was a cocksfoot/timothy/meadow fescue/white clover ley in its first year.

Hill ewes on foggage

Methods of wintering hill ewes vary widely. In parts of Breconshire and Radnorshire hill flocks are wintered on swedes and turnips, but in most of the other hill areas in Wales they are kept on grassland and usually allowed to roam over the whole enclosed area of the farm. The normal practice is to bring the ewe lambs down from the hill at the end of September and send them to the wintering farms, the traditional date for this being October 4. The yearling ewes and the weaker two-year-old and older ewes are brought down between early December and early January, weather conditions usually deciding the actual date. The remainder of the flock will, depending on circumstances, be left to lamb on the hill or brought down during late February or early March to lamb in the fields.

During 1954–55 it was decided to study the effect of wintering young ewes on foggage and compare them with a group which were allowed to run the enclosed fields in the traditional manner. The trial was continued at another centre in 1955–56. The technique of preparing and utilizing the foggage was similar to that described earlier. Ewes of the hardy Welsh mountain breed were used.

	Hill ewes grazing foggage Live weight (*lb*)			Hill ewes grazing free range Live weight (*lb*)		
	Jan.	April	Gain or loss	Jan.	April	Gain or loss
1955						
Shearling ewes .	50	56½	+6½	49	44½	−4½
1956						
Shearling ewes .	46½	53½	+7	47½	57	+9½
Two-year-old ewes .	53	60	+7	52½	62	+9½

It will be seen that experiments in the second winter gave more even results than those in the first winter. In both winters, however, the intensity of grazing varied appreciably between the two systems—the foggage field carried six ewes an acre, whereas the free-range grazing was at the rate of two ewes an acre.

Economics of home-wintering ewe lambs

Evidence collected at the experiment centres indicated that, economically, home wintering of ewe lambs on foggage compared very favourably with

wintering away on lowland farms. Detailed costs were kept at these farms, and the average cost per lamb—using the partial budget technique—at the three centres is shown below.

	Home wintering on foggage	Wintering away
	s. d.	*s. d.*
Centre 1, 1953–54 .	13 7	40 –
Centre 2, 1954–55 . .	17 –	30 –
Centre 3, 1955–56 . .	24 –	33 9

No allowance has been made for shepherding in the cost of the home-wintered ewe lambs. The high cost of wintering away at Centre 1 was due to heavy losses. At Centre 3 poor growth of grass caused by dry weather necessitated low intensity stocking and thus increased feed costs.

At all centres, wintering at home on foggage was much cheaper than sending the ewe lambs to a downland farm. The above figures are not, however, strictly comparable because the foggage wintering costs covered the period early December to early April, whereas the away-wintering figures are for early October to early April. It is worth noting that over the eight-year period of the Glensaugh experiment, a difference of 12*s.* 3*d.* per hogg was shown in favour of home wintering.

Practical problems

Experience gained in all these experiments suggests that successful results will be obtained from foggage grazing only if careful attention is given to the selection of the field, and to the type of sward and its management from late summer to the end of the grazing period. A well-drained, sheltered field will give the best results; a water supply is essential. A further point is that sheep always seem to thrive better if they are allowed to run back from the foggage to a stubble or an old permanent pasture.

Leys containing leafy strains of timothy, fescues and cocksfoot are the best for foggage production. They produce a bulky crop in the autumn and retain their leaf and quality into the winter. Ryegrass leys are not suitable for foggage on hill farms because they are apt to rot after severe weather.

Preparation of the foggage must commence in late summer or early autumn. Fields that have been grazed throughout the summer should be topped over and rested from mid- or late August to the end of the year. Immediately before the fields are closed, the aftermath should be grazed, preferably by cattle, and an application given of the equivalent of 40–50 lb nitrogen and 35–40 lb potassium oxide and phosphoric acid respectively, per acre.

Foggage should always be rationed to avoid waste by trampling and to ensure sufficient grazing throughout the winter. For sheep, a system of folding or paddock grazing has proved most satisfactory. In the earlier experiments, wooden posts and wire netting, with one strand of barbed wire, were used, but posts of angled iron have now been introduced and, although they are a little more expensive, they have proved more effective and quicker to erect and dismantle. Electric fencing has been a success, but the sheep must be trained beforehand and no new stock should be introduced during the feeding period.

In the experiments under consideration, the number of ewes or ewe lambs kept varied between three and six per acre, but well-prepared foggage should carry even more.

The use of foggage need not be confined to the wintering of ewe lambs. In fact, on many farms, it may be better utilized in improving the condition of breeding ewes before lambing. Whatever its purpose, properly prepared foggage can be invaluable on hill farms which carry a reasonable proportion of enclosed ploughable land.

References

1. Wintering Ewe Lambs. Some Welsh Trials. G. M. DAVIES, *Scot. Agric.* Winter 1954–55, **34**, No. 3, 149–53.
2. Experiments on the Wintering of Mountain Ewes. M. GRIFFITH and LL. PHILLIPS. *Welsh J. Agric.*, 1940, **16**, 206–26.
3. Wintering Blackface Ewe Hoggs. R. G. G. SMITH. *Scot. Agric.* Winter 1953–54, **33**, No. 3, 140–4.

Sheep Breeding in Israel

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Through the influence of the collective farm during the past twenty years, sheep improvement in Israel is showing very good results.

IN many countries of the Middle East, milch sheep constitute the main class of the livestock population. Sheep, like goats, are kept primarily for milk, which is consumed by the local population fresh or converted into cheese or yoghurt.

Cyprus and Israel have carried out extensive work relating to the development of the local Awassi (fat-tail) breeds, which are indigenous to both countries and the Middle East generally.

Sheep development work in Israel has reached a very high level of efficiency, and as far as milch sheep are concerned it is doubtful whether any other country is as far advanced. The sheep improvement schemes were started about twenty years ago under the direction of Dr. Finci, Head of the Israeli Ministry of Agriculture's Sheep Breeding Section. (Dr. Finci was formerly employed as a sheep breeding expert in Cyprus). At the start of Dr. Finci's work in Israel, milk yields from individual ewes varied from 100 to 150 kg* per lactation. By 1956, yields had reached 700 to 800 kg.

Kibbutzum or collective farms

Much of the success of sheep development in Israel can be attributed to the influence of the Kibbutzum or collective farms. These farms form the

* 1 kg=2·2 lb

nucleus of Israeli farming and land development, serving a threefold purpose: (a) for the production of essential food, (b) they play an important part in the overall defensive strategy of the country—in the event of an invasion each Kibbutz immediately becomes an armed fortress, and (c) they are the main receiving and occupational centres for displaced Jewish refugees.

Conditions at a Kibbutz are favourable to a progressive farming policy. There are usually good supplies of water for irrigation and domestic purposes. Pastures are well above the average for a Middle East country, especially when managed under irrigation and grazing control. The farm buildings are of sound, modern construction and complete with many labour-saving devices. In addition, there is an adequate resident labour staff. Workers receive no wages or salaries; all their material needs are provided free by the Kibbutz.

The general management of a Kibbutz is under the direction and supervision of a central committee, but emphasis is on specialization and the establishment of self-contained sections—such as sheep, dairy cows or poultry. Any of these not capable of being run on an economic basis are scrapped, or their activities reduced, and other sections likely to pay better correspondingly developed.

High standard of management

The size of flocks varies considerably—generally from 100 to 400. Each flock at a Kibbutz is in the charge of a skilled shepherd, with one or more assistants, according to its size. And here it could be said that the shepherds in charge of the registered flocks are often well educated, very adaptable and extremely keen on all aspects of sheep improvement. It is probably true, therefore, to say that much of the success of modern sheep breeding in Israel is due to the enthusiastic and untiring efforts of these men.

Management follows a set routine, with regular intervals for grazing and indoor accommodation. The flocks are brought indoors twice daily for hand or machine milking and the feeding of concentrates and hay.

As a general rule, the sheep yards are of standard construction and give complete protection from the weather, particularly during the winter months. Each is equipped with a series of small pens for individual lambing and accommodation of the unweaned lambs, which are kept indoors until weaning time at 8 weeks old.

A noticeable feature is the sturdy and modern construction of sheep yards, milking parlours and dairies. Extreme cleanliness is very much in evidence. During the winter months the covered yards are liberally littered with clean straw to the depth of about 1 foot. Electricity and water is generally laid on to all pens.

First-class equipment of standard design is in common use, and is designed mainly with an eye to saving labour and promoting efficiency; for example, hay racks are so made that they can readily be adjusted to the size of the animal.

Experiments have been conducted to prove that good management alone can play an important part in any sheep improvement scheme. In one experi-

ment 402 ewes were purchased from non-improved flocks, which were previously kept under a low standard of management. During the first year of the experiment, when the ewes were kept on low standards of management and nutrition, milk yields averaged 129 kg per ewe. During the second year of the test, with high standard of management and nutrition, the ewes averaged 250 kg.

Many flocks are now being milked by machine. In the spring of 1956, at a Kibbutz in the north of Israel, a large rotary milking machine was installed to milk 128 sheep at a time. Before machine milking it was very difficult to produce clean milk by normal hand methods.

To obtain high milk yields, a high plane of nutrition is practised. It is estimated that 70 per cent of the total requirements must be provided by pasture grazing, hay and concentrates providing the remainder. The total crude protein content of concentrates is anything from 5 to 10 per cent higher than for U.K. standards.

Flock improvement

There were about 99,000 sheep in Israel during 1956. Of this total, some 76,000 were kept in 350 Jewish flocks and 23,000 in Arab-owned flocks. Nineteen thousand milking ewes were officially recorded. All recorded flocks were maintained at the Jewish land settlements. Under the Government's sheep improvement scheme, thirteen of the best recorded flocks have been set aside as approved ram breeding flocks. These, along with other recorded flocks, are entered in the Register of the Sheep Breeders' Association.

The good results obtained from the sheep improvement programme is partly due to the widespread practice of a sound system of milk and progeny recording: for example every approved ram and recorded ewe has a separate card-index recording system which gives the following information: date of birth, ear tattoo number, registered number of sire and dam with breeding and milk records, also records of near ancestors. Lambing particulars are also entered, together with complete milk and butterfat yields of each lactation. In addition, every flock has a comprehensive flock register.

Each ewe is graded according to her performance, so that selection for specified matings is made easier. The card index also provides full information of progeny records. The flock register contains similar information in a more condensed form and excluding progeny records.

The considerable amount of investigational and research work has greatly facilitated the practical application of sheep breeding practices. In recorded flocks all the milk produced during the suckling period is calculated and included in the total production of the full lactation period. Until recently, this was calculated by weighing the first complete day's milk yield immediately after weaning the lamb and multiplying by the total number of suckling days. With this system it was found that there was a deficiency of about 20 per cent of the total yield, as maximum yields were reached at the fifth week of the lactation period. A new recording system is now being tested, with recording starting at the second week. The lambs are isolated from the ewes and the complete day's milk yield recorded. The ewes are officially recorded every four weeks until the end of the lactation period. The new

system has produced evidence that about 40 per cent of the total lactation yield is produced during the suckling period.

During the past five years it appears that milk yields from the best flocks have become more or less static, in spite of the fact that genotype selection of some of the best family lines has been practised. It is thought that further genetic improvement will be difficult to achieve unless a considerable extension of mass selection methods in conjunction with progeny testing can be made.

Much attention is now being given to ways and means of improving environmental and nutritional standards as an aid to further genetic improvement.

In recorded flocks during the breeding season the rams are isolated from the ewes. Teaser rams, fitted with special aprons, run with the flocks to detect in-season ewes. These ewes are removed from the flocks and taken to the selected rams, which are confined in the sheep yards, and assisted service is given. This system permits specified matings and allows the ram to serve up to 70–80 ewes per season, with very high conception rates.

Investigations have shown that irregular breeders are often associated with late lambing. In most flocks about 10 per cent of the ewes are classified as irregular breeders. Apart from the inconvenience, late lambing is generally uneconomic, therefore it is customary to cull the irregular breeders from the flock at the end of the lactation period.

Several experiments have been carried out to determine the main factors for twinning. It is now generally accepted that the plane of nutrition plays a greater part t n any other factor. Flushing on good pastures with the ewes in an improving condition increases the rate of twinning. It has also been found that stubble grazing, after combine harvesters, has a similar effect to flushing on good pastures.

The Ancient Cattle of England

SYDNEY MOORHOUSE

Most of the old breeds of cattle have had their day and passed into obscurity, but at least one of them, the Longhorn, still survives in sufficient numbers and popularity to make a gallant annual appearance at the Birmingham Fatstock Show.

BRITAIN has long held the reputation of being the stock farm of the world, and in the next few months it is confidently expected that thousands of pounds will be paid at the big beef cattle sales at Perth, Hereford, and other places, by overseas breeders anxious to introduce new sires to their own herds. Among the dairy breeds too, though prices are less spectacular, there is ever a steady demand from different parts of the world for cattle of good yields allied with the necessary butterfat and solids-not-fats percentages.

Such things are, of course, an accepted part of modern British stock-

breeding, which has become an entirely specialized affair; and, indeed, its development has been such that in the process new breeds and types have been evolved and the older ones, the very foundation of them all, have tended to disappear or become so rare that their existence at all is often a matter of surprise. The Longhorn, the Old Gloucestershire, the Blue Albion, the British White—these and one or two others were the cattle our English ancestors knew and cherished and upon which the best traditions of farming were built.

Their earlier functions were all-embracing. They worked as draught animals; they produced milk for making into butter and cheese, and they provided the staple food of the time, the almost fabulous roast beef of old England. In his *British Farm Stock*, the Earl of Portsmouth told us that "the early ancestors were notable because, while relatively unimproved, they had many latent qualities from which the great breeders could draw in later centuries". He went on to claim that even before such men as Bakewell and his eighteenth century contemporaries got to work, the *average* animal was probably better than now, and that as long ago as in the Middle Ages there were good cows that averaged over 400 gallons of milk a year without any winter fodder crops to sustain them. And if such yields seem small when compared with those of today, it must be remembered that milk was not regarded as a food in itself. The fact that it was turned into butter and cheese suggests that butterfat content was held to be more important than quantity.

The Longhorn and Old Gloucestershire

One of the most popular early breeds was undoubtedly the massive Longhorn, which still makes an annual appearance at the November Birmingham Fatstock Show, although in recent years numbers have dwindled considerably. This, of course, was the breed used by Robert Bakewell as the foundation of those famous experiments at his Dishley farm in Leicestershire a century ago. As the result of that system of close breeding which was to serve as a pattern for so many of his successors, Bakewell succeeded in building up a herd in which the smallest possible amount of bone was combined with a greater aptitude to fatten.

Unfortunately, other Longhorn breeders of the time failed to emulate Bakewell's example and the breed continued to be used mainly for draught purposes so that the diminishing use of cattle for ploughing and the simultaneous development of the more specialized beef types had their effect. Like most heavy breeds, the Longhorn is slow to mature and, consequently, could hardly offer an adequate challenge in a world where quick returns were allied to farming economy.

Although only a few herds survive—and these mainly in the Midlands—their owners are still sufficiently enthusiastic to keep going the Longhorn Cattle Society. The meat produced contains a good percentage of lean, so that those content to wait for maturity have little difficulty in finding a market for it. So long as this remains, we shall probably continue to see those red and red-brindle creatures, with the white line along the backbone and the menacing, downward-sweeping horns, measuring 3 to 4 feet across, at the Birmingham show.

The Old Gloucestershire, of which even fewer remain, has been described as the dairy type of Longhorn, and played a big part in the production of the local brand of cheese for which Gloucestershire was once famous. As a result, the breeders were much more concerned with the content rather than the amount of milk produced. But with the decline of farmhouse cheese-making and the growing demand for bigger yields of milk to be sold in liquid form, the ancient strain passed out of favour.

Today, the beasts that linger are kept mainly in the parklands on the western side of the Cotswolds and can be claimed as having similar beefing qualities as the Longhorn, and although they are rather slow to mature as milkers, they continue to produce well for a long time. As also in the case of the Longhorn, there are usually one or two of the breed whose general colour is dark dun and who bear the same white stripe along the spine and downward sweeping horns (though not so long) as their relatives.

Wild White to British White

Last July, a breed based upon what many claim to be England's oldest type of cattle appeared for the first time under their new name at the Royal Show at Norwich. This was the British White. The new title came into being as recently as 1946, when that of the Park Cattle Society (formed in 1918 with the object of "keeping a record of the herds of British wild cattle, of developing and popularizing their undoubted commercial qualities, and of preserving interest in the ancient race") was altered to the British White Cattle Society. Today, some thirteen herds are registered with it, mainly in East Anglia.

There seems to be little doubt that these cattle, which are polled and are dominantly white, are related to the herds of "wild" white cattle preserved in the parklands at Chillingham (Northumberland), Cadzow (Lanarkshire), Woburn (Bedfordshire), Dynevor (Carmarthenshire) and Vaynol (Caernarvonshire). Like the members of the more noted herds, the tips of their noses, the insides of their ears, and other "points" are either black or red, but whereas the parkland cattle retain many habits and characteristics of the wild, the British Whites are regarded as good dual-purpose beasts, capable of giving a useful yield of milk and producing fine, marble carcasses of beef.

Although mainly centred in East Anglia, it would seem that much of the foundation blood is derived from Lancashire stock. When Whalley Abbey, the Cistercian monastery beside the river Ribble, was dissolved, a herd of white cattle was maintained in the park, and this is usually claimed as having been descended from the wild cattle that roamed the ancient Forest of Bowland, on the borders of Lancashire and Yorkshire. The Whalley estates were bought by Richard Assheton, and some of the cattle went to his parklands at Middleton, not far from Manchester. There they stayed until 1765 when, following the death of Sir Ralph Assheton, the elder of his two daughters married Lord Suffield, who lived at Gunton, some 16 miles north of Norwich, and the cattle went from Lancashire to Norfolk. They remained at Gunton until the middle of the last century.

Before the Gunton herd was finally disbanded, however, it had supplied females to many of the Park herds in East Anglia, including the Woodbastock herd (now owned by Lt. Col. H. J. Cator) which dates back to 1840.

Another well-known herd is the Bawdeswell, founded by Lt. Col. Q. E. Gurney in 1912 on stock transferred from his father's Northrepps herd, founded in 1890 and based mainly on Gunton blood. Today, the British White is not only the best established of all the ancient breeds but has also, in recent years, been developing an export trade of its own.

The last of the Blue Albion?

For many centuries, another dual-purpose breed, the Blue Albion, could be found on the Peak district hills of Derbyshire, and it is only within the last few months that the last herd, belonging to Mrs. Dolly Parker of Mugginton, was sold. The herd of 38 averaged £60, with the top price of 87 guineas being paid for a bull. This dispersal means, of course, that specimens of the breed are now scattered among various herds, mainly of the commercial type, so that it seems as though the Blue Albion will disappear entirely within the next generation or two. Although well adapted for the hilly pastures of the Peak country, one of the chief faults of the Blue Albion was its failure to breed true to type. It is said that Shorthorn, Welsh and, probably, Friesian blood was introduced from time to time, but, as in the case of so many of the old breeds, it was unable to withstand the stern competition from the more specialized kinds.

In the New Forest there once existed a small dun- or brindle-coloured beast not unlike the Guernsey in general conformation. This was said to have come from cattle brought from Normandy by the monks of Beaulieu Abbey, and it may therefore well have had a common origin with the Guernsey. But the breed became virtually extinct many years ago, as did similar cattle found farther west, in Cornwall.

Other old breeds have, of course, been incorporated in more modern stock. The Red Poll, for instance, seems to have been evolved about 1846, when the horned Norfolk and the polled Suffolk Dun were merged. In the north-east, the dark-coloured Celtic Shorthorn lingered on for many centuries on the borders of Yorkshire and Durham and was eventually "improved" by the importation of red cattle from the Netherlands towards the end of the seventeenth century. From these came the Teeswater Shorthorn, upon which, a century later, the Colling brothers carried out those breeding experiments which were the foundation of both the Dairy and Beef Shorthorns as we know them today.

Fatal Accidents in Agriculture, 1956

England and Wales

FROM the accompanying analysis of fatal accidents in agriculture it will be seen that the overturning of tractors has been the greatest single cause of death. It is clear from the reports received from the Ministry's safety inspectors that many accidents of this sort would have been avoided had more care been taken or tractor drivers been more aware of the dangers. Falls from

tractors account for a large number of accidents, and five children were killed from this cause alone.

Deaths from these two causes will probably increase as more and more tractors come into service, unless it is fully realized that even experienced drivers must take the greatest possible care. Beginners must be carefully trained and restrained from undertaking difficult or dangerous jobs too soon. Tractor driving is a full-time job and any distraction, especially the carrying of passengers, can easily be the precursor of a fatal accident.

Similarly, people riding on the draw-bar of machines, or insecurely perched on any part of them, may easily fall off and be run over and killed. And why, too, when someone is working underneath a heavy piece of field machinery are precautions so seldom taken to ensure that there is some secure prop, in addition to the jack, which will hold the machine up if the jack itself collapses? Whether it is just thoughtlessness or contempt for danger, the result can be the same!

MACHINERY		BLOWS AND WOUNDS	4
Tractors		FALLS	
(a) Overturned	21(1)	From ladders, steps, stairways	3
(b) Overturned—Silage heaps	6	From platforms, ricks, stacks	1
(c) Falls from	10(5)	From vehicles and trailers	7(3)
(d) Various	6	From other heights	4
Implements and machines (including self-propelled)		Through floors or openings	2(1)
(a) Power take-off shaft	2	Other falls	4
(b) Various	13(5)		21(4)
Fixed and portable machinery (including power tools)	9(3)		
Lorries and cars	3(2)	OTHER ACCIDENTS	
Electricity	4	Burns and scalds	2(1)
Burns and scalds (involving machinery)	2	Miscellaneous	
		(a) Gun-shot	10(2)
		(b) Lightning	2
	76(16)	(c) Others	6(2)
			20(5)
ANIMALS			
Bulls	2		
Other	4		
	6	TOTALS	127(25)

NOTE: Fatal accidents to children under 15 years are in brackets and included in the totals.

Falls from vehicles and trailers accounted for seven deaths in England and Wales, three of these being children. Most of them were in some way due to the movement of the load, particularly loads of baled hay or straw. The chance of a bale turning under a man's weight when it is carried on a trailer over uneven ground is great. Loads should always be roped or secured before carting, whether a passenger is riding or not.

The gun-shot accidents included in the statistics are those where it is clear from the reports received that the fire-arm was carried for the purpose of pest or vermin destruction rather than for sporting purposes. Tractor drivers sometimes take guns with them when driving, not realizing how dangerous

this practice is. All employers and all parents would do well to forbid the carrying of any fire-arm on a tractor or machine.

The absence of guards on barn and similar portable machinery has also been the cause of a number of fatalities, whilst faulty earthing of electrical equipment, amateur installation work, or contact between metallic parts of machines and overhead power lines have also made their contributions.

Whatever the immediate cause of the accident, lack of care and thought are usually evident. The fewer unnecessary risks that are taken, the less accidents there will be.

Month in the Forest

J. D. U. WARD

Planting—Dual-purpose trees—Foliage market

NOVEMBER usually marks the beginning of the planting season, which continues until March. There is often a difference of opinion as to whether November or March is the best of all planting months. In the North at high elevations, in very exposed positions or, indeed, in any situation which is likely to experience unkind winter weather, there is much to be said in favour of March planting. In more genial conditions, November may be preferred so that the young trees may, as it were, become a bit weathered before they start growing. Incidentally, if a forester is faced with a large planting programme and has only a small staff, he may, with reasonable hope of success, plant whenever the weather permits, from about mid-October to mid-April.

The number of trees which can be planted in a day by one man varies widely, depending on the kind of soil, and trees, on the experience of the planter and the quality of his work; but if the plants are between 9 and 18 inches high, it should be possible to deal with 500–900 a day. It is certainly better policy to have the trees planted well, with roots correctly spread and everything firm, than to save a pound or two on a hasty job. The long taproots of oak plants can be a bit troublesome and I know one expert who thinks that for this particular job a small crowbar makes a better tool than either spade or mattock!

To buy rather large trees, the left-overs which some nursery wishes to dispose of, is seldom an economic proposition. They may succeed in exceptionally well-sheltered places such as the gaps in a patchy wood, but experiments have shown that, normally, good, young small trees overtake the older ones of, say, six to ten years.

The advantage of planting in straight lines and with accurate spacing is evident when weeding and cleaning have to be done, for the small trees may be difficult to find. If a less regimented effect is required by a roadside or other boundary, staggering is easily contrived for the three or four outermost lines of trees. And staggering is usually desirable in greater depth where plantations of two sharply contrasting species meet (say, Japanese larch and Douglas fir).

A certain wariness about the fashions in species, which I have mentioned before, is desirable. At the moment, the Western Hemlock (a beautiful tree and also most useful for underplanting) is much in favour, but its timber, when not pressure-creosoted, is not of very high quality for farm or estate use. European larch is out of fashion, yet is a first-class subject for odd farm lands, provided young trees of a good race are used. Douglas fir is no good in a windy spot—and pity the misguided user of untreated Douglas stakes for a serious lasting job! If you plant either Douglas fir or Norway spruce by the roadside, some losses to Christmas tree thieves must be expected.

Where small woods, or shaws beside a drive or at the side of a house are concerned, there is considerable scope for the effective use of those species sometimes ranked as amenity or fancy trees but which also have some value as timber. Incidentally, it is worth recalling that several of our most valued economic species were originally introduced as collectors' trees, primarily of interest to landscape gardeners and owners of arboreta: the Douglas fir and Sitka spruce are only two examples of handsome trees which were once admired but have recently lost favour with a generation which dislikes modern forestry and prefers to speak about "alien conifers" and "dark battalions marching over the hills".

Species that are too seldom planted to good effect include golden, white and grey poplars, the better silver birches, golden elm, silver maple and the red oaks. *Quercus borealis* (syn. *rubra*) is the red oak most often used by foresters (it is quicker growing and less discriminating about soils than our native oaks), but unfortunately the beauty of its autumnal colour tends to diminish as the tree grows up. *Quercus coccinea* is more persistently ornamental. In the south, if a near-evergreen is wanted, the Lucombe oak might be tried. This is a hybrid from the familiar Turkey oak and the cork oak. The timber of the Lucombe oak is said to be good, but first crosses tend to vary in character, and it is only the first cross that displays exceptional vigour and speed of growth. Foresters do not seem to have experimented with the Lucombe oak, which was first produced at Exeter nearly 200 years ago.

Before November is over, Christmas trees will be in mind. If you have to take out a few 15-year-old Norway spruce or Douglas fir poles, for thinning or other reasons, remember that by mid-December their fresh tops may be saleable and for a much higher price than the poles would realize!

The owner of a few acres of woodlands, shelter-belts or corner shaws cannot usually watch such trivialities as the foliage market, yet the really "small man" may like to bear in mind that there is a demand for certain kinds of foliage, for instance of cypress, thuya and some silver firs. I was interested to hear that foliage obtained from the brushing-up of a few *Cryptomeria japonica* (sometimes called the Japanese cedar) proved saleable immediately. Incidentally, *Cryptomeria japonica* is another of the ornamental trees which may yet find a place in the schemes of the economic forester; research reports on it have been encouraging. In general appearance it much resembles the familiar wellingtonia, but its foliage is a little finer.

Lastly, November is a month when acorns and sweet chestnuts can be picked up. Remember, that seed gathered from below really good trees is not likely to do any substantial harm if planted three inches deep in the soil in bare patches in the woods.

Farming Affairs

Talking about poultry

Most present-day poultry-keepers have been reared on the concept that egg size mattered and would, in fact, pay them in cash. This was certainly so with pre-war grading, but the picture has changed rather since the war. For one thing, the weight of a standard egg has been slightly reduced and for another, the question of food conversion per dozen eggs has been very much in producers' minds over the past few years. This is no doubt due to the fact that many of the newer strains of hybrids whilst having good food conversion, have not the egg size of the older type of bird. Indeed, some people are saying that the number of eggs is more important than the size.

I think, therefore, that quite a few producers were beginning to feel that perhaps egg size was not so important. Now, however, the Egg Marketing Board has said quite clearly that large eggs are going to command a much better price. Granted this may be due in part to seasonal variations in production, but it has also been quite clearly said that the customer likes large eggs and that therefore a better price will be paid for them. This is an interesting situation and the producer must decide how he is going to meet it, if indeed he tries. When the pullet flock is coming into production, everyone has this problem of "smalls" and extra small eggs, and it does seem to me that here we have yet another advantage in the recent trend of hatching our egg producers three times yearly. Not only are there always two-thirds of the birds in full production, but two-thirds of the flock are in good egg size as well, and I think that this second factor may well become increasingly important.

Many producers are now considering culling their laying flocks. This is, of course, being done with an eye on the Christmas market and on the possibility of a clean up of part of the equipment. Now with cages or any form of individual record it is quite easy—you simply take the cost of feed per bird per week, and with the price of eggs in mind, it is possible to say at once whether a bird is covering her food consumption and other costs. On the other hand, where so many of our birds are housed in deep litter or other large intensive groups, the culling presents a very different problem.

Frankly, I very much doubt whether it is worth solemnly culling through a complete house. The disturbance can do the flock more harm than good, and I am by no means satisfied that the average man's decision as to whether a bird is laying satisfactorily is correct. On handling, a small percentage of the birds will obviously be in first-class order, and a small percentage will equally obviously be out of lay. But most of the flock will be in production—to what extent it is certainly not easy to say. I think here it is much better to cull on your flock averages and to base your opinion of an individual bird on the flock and not on the individual; for example, if the flock has been laying for eight or nine months and is looking ragged and worn, as it should do, then the bird to throw out is the one which looks in fine fettle and good feathers. Here is a case where fine feathers may well mean lazy birds.

C. T. Riley

At the Farmers' Club

Prospects for Fruit and Vegetable Growing

Pre-packing is a controversial question, and two speakers at the Farmers' Club on October 2 expressed decided views about it. Mr. Giles Tuker, Chairman of the N.F.U. Fruit Committee, dealt broadly with the problems of the fruit grower, and Mr. E. H. Gardener, Chairman of the N.F.U. Central Horticultural Committee, surveyed the trends likely to accentuate changes already discernible in the vegetable industry.

Mr. Tuker was not convinced that pre-packing apples and pears would lead to a big enough increase in consumption to recompense the grower for the packing cost; he added that he did not see how pre-packing of apples and pears can benefit anyone except the manufacturers of paper and plastic wrapping. He advocated a drive to encourage the fruit habit rather than placing over-emphasis on the packing angle.

The United Kingdom apple and pear industry is faced with a rapidly expanding output of top fruit in Europe, especially in Italy. And this is apparently coupled with a falling consumption in the United Kingdom, while home production is rising in spite of a declining acreage. We have, said Mr. Tuker, all the anxieties of a buyer's market, and the only answer to European overproduction would, in his view, be a quite modest tariff, sufficient to steady the flow of cheaper, lower quality apples. "I am sure", said Mr. Tuker, "that the poor flavour of some of these imports is a factor in declining demand."

Good flavour and eating quality are vitally important in stimulating demand. The pretty, but tasteless, red apple will not bring repeat orders. By stimulating and extending the fruit habit, we could increase demand by 20 per cent without much difficulty—by 50 per cent if we tried really hard.

Quality is also important in soft fruit; and this should be the growers' aim, relying on the fruit itself to do its own publicity.

Mr. Gardener, feeling, in his own words, rather like the prophet Elisha, but without attendant bears, forecast major changes in vegetable production. Quick freezing has brought an increased demand for processed vegetables, matching present-day prosperity and the desire for labour-saving products. This in turn means special crops and varieties; for, said Mr. Gardener, "the processing industry has never been, and will not be in the future, built up on surplus crops".

The tendency is for crops intended for processing to be grown where conditions suit them best, the factory being sited near the crop. Processing benefits mainly the large grower—one able to use the latest technical developments in machinery and crop protection, and often located some distance from consuming areas.

The small grower on a family holding, working long hours and employing no outside labour, may survive provided he has the ability to sell a restricted variety of crops in keen competition. But for such men, co-operation on the lines of the Land Settlement Associations deserves careful consideration.

The grower facing the biggest difficulty is the man with a medium acreage, employing a number of men, closer to the centres of consumption than the processing industries, and with an acreage rather limited for processing crops, yet too small to turn to farm crops.

Pre-packing may help the medium grower, but so far the greatest outlet has been for the commoner vegetables such as potatoes and carrots, usually grown on a large scale. Mr. Gardener considered that it is still too early to say whether the future of pre-packing will lie with the grower or with separate packing and marketing organizations.

"I believe most strongly that we could encourage the consumption of vegetables in this country to a far greater extent," said Mr. Gardener. "How many people in this country ever think of using salads with their steaks?" Increasing consumption means selling an attractive product at an acceptable price, supported by publicity. This would benefit particularly the smaller man, to whom crops with a fairly high return per acre are specially important.

Sylvia Laverton

Tractor sense

On every farm, the use of a mounted muck-loader is one tractor operation which is worth a simple method-investigation. The cycle of operations involved in moving the manure from a heap and putting it on a spreader can easily be timed, and the whole routine of filling the shovel of the fore-loader, manoeuvring the tractor towards the spreader, discharging the load on to the spreader and then taking the tractor back ready to fill the shovel again should be completed within one minute. If it is not, examine the operation critically by checking the following points. The spreader should be placed at right angles to the edge of the heap so that the travelling and turning of the tractor is kept to a minimum. Then look to the method of using the shovel. When the loader approaches the heap, the prongs of the outfit should be set the depth of one fork-load below the top of the heap. The point here is that time will be wasted if the equipment is used as a face-shovel: its proper function is to take the manure off in layers.

It may be found that loss of grip in the tyres of the tractor's driving wheels is causing not only waste of time, but also wear on the tyres and tractor transmission. Slip is often caused by running on the muck and the ground should be cleared as well as possible before the tractor drives over it.

If, after paying heed to these points the routine is still taking too long, examine the general conditions in which the work is being done. Perhaps the yard is too long and narrow, or there is an obstruction (for instance, an old manger) which is making the manoeuvre difficult; a pot-holed surface can also give trouble. This question of the shape and surfacing of the yard is certainly one to keep in mind when new buildings are designed. It is also worth remembering that most tractors need a circle 20 feet in diameter in order to turn round in one sweep; the projection of a fore-loader will increase the diameter required.

Experience has shown that loading is not speeded very much if the driver who has brought the spreader tidies the heap to help the man with the loader. In fact a case can be made for having the loader at the yard without an operator so that when each driver of a spreader arrives he loads his own spreader.

A tractor that is going to be used for a great deal of fore-loading work ought to be fitted with over-sized tyres at the front to carry the extra weight. After all, the bucket carries a heavy load and tends to act as a lever trans-

ferring the weight from the back to the front wheels of the tractor. For this reason concrete weights are often used at the back of the tractor because the rear wheels need ballast to make them grip. But this makes the whole outfit very heavy and before fitting the weights, it would be advisable to find out whether adequate wheel grip could not be achieved more effectively by making the floor of the yard firmer.

H. J. Hine

Profit from milk?

The viability of the small farm is currently one of the most discussed agricultural problems, particularly in Wales, and recently some 500 Carmarthenshire farmers saw why two of their neighbours are confident of the future. Here in the Towy Valley are two small farms where, in spite of increased costs, profits are good *and rising*.

"Profit from Milk?" was the theme of a demonstration and conference, organized by I.C.I., the object of which was to see and discuss the problems that face small dairy farms in Wales. The farms visited—Cilwaunydd, Ffairfach, (Mr. S. Thomas) and Towy Cottage, Gelli Aur, (Messrs. W. Griffiths and Son) both at Llandeilo—are 33½ and 56¾ acres respectively. On each the main enterprise is milk production, with subsidiary poultry-keeping.

Both farmers are endeavouring to reduce costs of production and increase profitability by making greater use of leafy grass crops and grass silage. They are improving the quality of their grass by more liberal fertilizer treatment and better management. They are adapting their buildings at low cost and taking advantage of the Silo Subsidy Scheme in order to allow their cows to self-feed on silage in the winter months. This practice greatly reduces the labour of feeding silage and enables higher levels of milk production per cow to be sustained from the silage diet before the use of purchased concentrate feeds is necessary. Expenditure on cake has been reduced by 137*s*. and 51*s*. per acre respectively at Cilwaunydd and Towy Cottage during the first six-month period of 1957 compared with the corresponding period of 1956. Outlay on fertilizer for the whole of 1957, on the other hand, has increased by only 31*s*. per acre at Cilwaunydd and 11*s*. per acre at Towy Cottage over the 1956 figure. The success of the policy of reliance on grass is demonstrated by the fact that average sales per cow are 1,109 gallons at Cilwaunydd and 983 gallons at Towy Cottage. More than half these total sales per cow has been produced from grass, silage and green fodder crops.

Speaking at the conference, Dr. Richard Phillips, Ministry of Agriculture Liaison Officer for West Wales, said that the position of the small farmer in Wales is difficult, but that science can be the salvation of Welsh farming, and scientific and technical methods should be applied to the ways of the small man. "Base your production on grass—the cheapest food there is for cow or sheep. Take advantage of the grazing field and the manure bag" was his advice. Summing up the discussion, Mr. Emrys Jones, Director of the N.A.A.S. for Wales, said that farmers should examine their systems of management. "Big business is the key to profitability, even though the farm is small—and there is no hope unless this is the aim. "As a result of examining hundreds of farm accounts, I can say that no small farmer goes to the wall because of high costs—but because of low income."

In Brief

OFF WITH THEIR HORNS

A survey by the M.M.B. among national milk-recorded herds last year showed dehorning of dairy cattle to be gaining in popularity. Then more than one-half (56·3 per cent) of all Ayrshire cows in N.M.R. herds were dehorned; Dairy Shorthorns, 17·3; Friesians, 35·9; Guernseys, 38·3; and Jerseys, 25·3.

These figures are given in the current report of the Production Division of the Milk Marketing Board, which also records the information that at the time the recording visit was made in the spring of 1956, 28 per cent of the 492,062 housed cows, 77 per cent of the 118,744 yarded cows, and 45 per cent of the 93,415 outwintered cows were dehorned.

Fifty per cent of farmers used the caustic method, 27 per cent a hot iron, 17 per cent a collodion, and 6 per cent used either a combination of any of the above methods or some other.

AN ANSWER TO BLOWING?

We have our troubles from soil blowing in the Fens, as Mr. Vernon Cory pointed out in his article last month. In the Netherlands, too, it appears, considerable local damage is caused by wind erosion, particularly on reclaimed peat soils, the mixed soils of low fen and sand behind the dunes and the sandy soils. Research work there has resulted in a Dutch firm making a preparation from starch derivatives, which are sprayed on to the soil. Insecticide sprayers can be used. The chemical acts by binding the top layers.

Trials with this preparation, carried out on fields planted with asparagus, have, it is reported, given promising results. Heavy rainfall hardly affected the form of the beds, and there were no signs of the preparation being washed out.

SHEEP MAY SAFELY GRAZE

"Wool is more than holding its own with synthetic materials, though very often successfully mixed with them", writes Mr. J. Grosvenor in the P.L.A. Monthly. "Indeed wool, again like timber, whose latest processing methods are a triumph of science and technology, climbs ever upward, and in the last year or two has, like Cinderella arrayed for the ball, graduated from utility, however agreeable, to become the Fairy Princess of *haute couture*".

South African sheep farmers are apparently having trouble with sheep thieves. But some seem to have found an effective answer by putting a few ostriches in their flocks. These birds take formidable action against anyone trying to enter the pastures or alight from a vehicle, and their reputation for ferocity is proving an effective deterrent.

WATER-TRAPS FOR GRAIN PESTS

A water-trap to detect the presence of insects in stored grain has been used by the Canadian Department of Agriculture. The more usual method is by sampling. Six 1 oz glass jars were filled with water to within an inch of the top, then spaced uniformly and pushed into the grain until the tops were level with the grain surface. After a week to ten days the jars were taken to the laboratory and examined for pests. Most species of insects common to stored grain in Manitoba were found in the traps. However, it appears that the usefulness of this method

of detecting stored grain insects depends on the depth of the infestation. Fewer insects were taken in traps as the depth of the grain increased.

Indications are that insects do not wander aimlessly throughout stored grain and fall into water-traps by accident. There is strong evidence that they are attracted to the water-trap areas by the higher moisture content. Jars with no water in them were used as a check and spaced throughout the grain in a similar manner to the water-filled jars. At the end of the test period the empty jars contained fewer insects than the water-traps.

RABBITS IN NEW ZEALAND

Rabbits—for so long the grey scourge of New Zealand—lost their last vestige of unofficial protection by an Act which took effect early this year making it illegal to sell or export rabbit skins or carcasses. This drastic step, which has removed tasty rabbit dishes from the tables of New Zealanders, is another stage in a "killer" policy designed to eradicate the rabbit pest from the country. All available means, including poison dropping from the air, are being used in the continuing and unrelenting attack. From liberations which were made in the 1860s, rabbits multiplied at an alarming rate and were soon causing untold harm to farms and runholdings, particularly in the southern areas of the South Island. With the reduction in the carrying capacity of millions of acres of farm lands, many farmers were forced to live off the rabbit. Measures were adopted that ensured recovery of the body either for the value of the skins or the carcass or both, and activities were frequently confined to the winter months when extermination methods gave the greatest cash return. This approach merely perpetuated the pest.

Now, with the prohibition for sale of any rabbit skin or carcass and 202 rabbit boards covering half the total area of New Zealand and concentrating upon the methodical elimination of the pest, previously denuded areas are being recovered, lambing percentages are higher, wool weights are up and the carrying capacity of pastures increased.

TARGETS FOR SOVIET AGRICULTURE

In a recent speech Mr. Khruschev said he wants Soviet agriculture to catch up with the United States in the output of milk and butter by 1958, and in meat production by 1960 or 1961. This means an increase in milk production by about 40 per cent, and in meat by more than 300 per cent.

Speaking at the opening of the 1957 Agricultural and Industrial Exhibition in Moscow, Mr. Khruschev stated that beef production in 1956 was 2·2 million tons, but it could be increased easily to 7 million tons by 1960. To achieve this target, the number of cattle is to be raised by 40 per cent during the next four years. This increase would result in another 1·5 million tons of beef annually by 1960. A further 2 million tons would result from better feeding of cattle on collective and state farms, and from improved maintenance of cattle at delivery stations and in transport. He added that collective farms slaughter about 1·5 million head of young cattle, and collective farmers also slaughter many privately-owned calves before they reach the age of one year. By postponing slaughter until the cattle are 1½ to 2 years old, about 1·2 million additional tons of beef could be produced.

BEET HARVESTING PROBLEMS

Harvesting of sugar beet by machine began to receive really serious attention about twelve years ago; but it has since become clear that this one operation cannot effectively be isolated from the cultivations that have preceded it.

If the surface of the field was not level, then probably the drilling was not straight. If the seedbed was "cobbly", much of the seed no doubt fell into pockets and failed to germinate. If the field was spring ploughed, it probably dried out and the plants that did emerge came through days apart in time and feet apart in distance. Then again, perhaps the tractor-hoe cut out a thousand or two plants to the acre due to the wanderings of the drill, and the mechanical thinner likewise operated to the detriment of the final plant population, for similar reasons.

After preliminaries such as these, it is asking a lot of any mechanical harvester either to restore a plant that has been missing since the spring, or to top, lift and clean those which remain.

No doubt this was what the Director of the National Institute of Agricultural Engineering had in mind when he wrote in his annual report for 1955-6 that "if hand singling is to be eliminated, it will be necessary either to improve down-the-row thinning techniques, or alter the general principles of beet harvesters". It is also the reason why the national demonstrations of sugar beet machinery now endeavour to take the visitor right through the mechanized cultivations from previous cereal crop to sugar beet harvest.

THE FARMERS' CLUB CUP

A member of the Farmers' Club has presented a silver Challenge Cup to be awarded to the reader of the Paper which, in the opinion of the Club Judges, is of the greatest value to agriculture or horticulture. Each award will relate to the papers given in the period December to November, beginning December 1956.

The name of the winner will be announced, and the Cup presented to him, at the Farmers' Club Annual Dinner in December.

SEVENTH NATIONAL PLOUGHING MATCH

The National Ploughing Championship Contest, which is being held at Bonnington Farm, nine miles west of Edinburgh, on 6-7th November, is divided into four classes, comprising two styles of ploughing—high-cut work and general-purpose whole-work. " High-cut " (also called the " oat seed furrow ") is now an old style of ploughing but was for a specific purpose. It is held to be the acme of perfection of the ploughman's art. Before the introduction of corn drills and other modern aids to cultivation, grain had to be sown by hand. This demanded a closely packed and narrow furrow so that the seed grains did not fall too far apart from each other, and the tight packing of furrow against furrow prevented the grain falling through gaps to be lost beneath the upturned sward. All the upturned furrows look like equilateral triangles, and the apex of the triangle is known as the " comb " or " crest ". This " crest " is high, so that when the harrows are drawn across the ploughing, they break up just enough soil to cover the hand-sown seed grain lying in the furrow " seams " and thus make a satisfactory seedbed.

The general-purpose whole-work section is for tractor ploughing only. One class is for the trailer type of tractor plough and the other is for mounted hydraulic ploughs. The furrow in this section has to be flatter and much heavier than that required in " high-cut " work.

SWITCH

It is reported from Sydney, New South Wales, that wheat is no longer the principal source of income for most Australian farmers. Many Australian farmers are switching from wheat growing to sheep raising.

Book Reviews

Management Accounting for Agriculture. S. V. P. CORNWELL. Gee. 20*s*.

The bibliography of farm accounting in this country is fairly extensive, but this short book is a notable, if provocative, addition to the subject.

The author seeks to show that there is ample scope for the greater use of industrial management accounting in agriculture. Up to the present time any progress in this direction has been hampered by the lack of formal association between the farmer, the National Agricultural Advisory Service and the practising accountant. Mr. Cornwell suggests that "standards" similar to those used in industry could be produced for agriculture; and he outlines some considerations which should underlie any attempts to prepare farmers' accounts in a uniform manner so as to be of maximum use to the advisory officer. Above all, the burden of keeping elaborate farm records should not be placed on the farmer himself, who has probably neither the time nor the inclination to do so.

In the last part of the book some of the standards which are at present available are examined critically, and a description is given of an experiment carried out with some of the standards made available by the Agricultural Economics Department of the University of Bristol.

Mr. Cornwell does not claim any great originality for his basic ideas, for which he finds antecedents in much that has already been achieved in industry. Indeed, there are facts in this book that many people have been aware of for a long time, but until now the information has not been gathered together in one place.

The most notable service to all interested in agriculture comes in the stimulation this book affords to the growing awareness that all aspects of the study of farm management need to be much more fully integrated. It will be interesting to see the kind of reception the book will get from the accountancy profession to which much of what the author has to say is addressed.

S.T.M.

Dutch Lights for Growers and Gardeners. (Agricultural and Horticultural Students Series.) A. R. CARTER. Vinton. 12*s*. 6*d*.

The Dutch light is now well established as the principal medium for protecting crops grown by the intensive cultivators. Incidental reference to it has often been made in writings on intensive cultivation, but here is a book which is devoted to an account of the light and its use.

It is easily seen that the author is very familiar with the handling and use of the Dutch light; a thoroughly practical note is struck in the first chapter and maintained throughout. A concise account of the light and the erection of frames is followed by chapters dealing with the site and its layout, irrigation, and soil warming. In discussing the use of preservatives a caution against the use of creosote should have been given.

After some 80 pages devoted to details of crop cultivation in frames, instructions are given for the erection of Dutch light structures and their cropping. As would be expected, lettuce in frames and tomatoes in cold structures receive a major share of attention, but many other crops are listed as possible alternatives. How profitable some of these may prove will depend on many factors, but a table in the appendix giving a list of some crop returns may serve to some extent as a guide.

In attempting to be comprehensive it is inevitable that some crops should get little mention. Perhaps some deserve that treatment, but it is a pity that others should suffer—strawberries, for instance, might have received fuller attention. The account of chicory forcing suggests much too thin a layer of soil as a cover to the roots before adding a layer of dung, and late August is, I think, too late to sow parsley.

Several useful series of cropping sequences for frame and structure are provided together with diagrams to illustrate the changes of site for the lights. Good photographs and simple line drawings illustrate the book; a few more diagrams in the earlier constructional chapter would have been helpful.

J.R.

The Underground Organs of Herbage Grasses. (Commonwealth Bureau of Pastures and Field Crops Bulletin No. 44.) ARTHUR TROUGHTON. Commonwealth Agricultural Bureaux. 25*s*.

Grasses are almost unique in their adaptation to frequent, and often severe, defoliation. All the same, their recovery after cutting or grazing is much influenced by the severity of defoliation. It is a relatively simple matter to measure the effect of a given intensity of cutting or grazing in terms of recurrent herbage production; but in order properly to understand this effect, it becomes necessary to study the reactions of those parts of the plant which remain. A large part—though seldom the whole—of this remainder is underground. Among perennial grasses there are many species capable of surviving long periods of intense cold or drought, during which only the underground organs continue to function. These organs clearly have functions other than anchorage and the uptake of nutrients, and deserve closer study.

The Commonwealth Bureau is to be congratulated on perceiving the need for a review of published observations and experimental data relating to grass "roots". The author has done his job thoroughly and has set out the results of his survey systematically. The anatomy and life history of roots, rhizomes, corms and leaf-bases are considered first; then comes a fairly long section on seasonal changes in composition, which are discussed in relation to seasonal growth and removal of herbage. The next major section is devoted to factors influencing root growth, including farming practices and association with other plants. Only a relatively short space is occupied by the available information on decay of grass roots, and on the effects of grass roots upon soil structure. A brief description of some methods used in the study of roots completes the text. There is a full bibliography.

The book is mainly an orderly collection of abstracts. There is some cautious discussion only where the author considers that the facts are sufficiently well established to justify some inference. Not every reader will agree that, on the evidence brought forward, the true roots can be regarded as storage organs playing a major part in the recovery of herbage—at least in mesophytic species. But this is only one of many issues which will remain controversial until the gaps in our knowledge of roots and shoot-bases are filled, as filled they must be if we are to know the true principles on which to base grassland management.

Any student of applied botany seeking ideas for research would do well to browse through this bulletin: questions present themselves at every turn. The book will also be valued by agronomists for reference to such information as does exist.

J.O.G.

Marketing of Fruit and Vegetables in Europe. O.E.E.C., Paris. H.M. Stationery Office, London. 12*s*. (12*s*. 9*d*. by post).

At the request of the O.E.E.C. Working Party for Fruit and Vegetables, this booklet was prepared to provide as much information as possible on fruit and vegetable marketing in the O.E.E.C. countries concerned. It is intended as a working basis from which further consideration may be given by the Working Party for any steps needed to introduce more rational marketing methods which, it is hoped, will bring benefit to both producers and consumers in the member countries.

Information about each of the thirteen countries is dealt with separately with brief reports on the various factors related to marketing. Subjects included extend from descriptions of areas and types of production, through the organization of markets and the selling methods of the various classes of producers, to the numerous types of retailers and their methods. The developments in marketing research and in the standards both of produce and containers are described, and many other facets of marketing such as transport facilities, consumption trends and the extent of foreign trade are covered.

There are a number of maps, graphs and tables showing the produce-growing areas, seasonal distribution, annual production and consumption, imports and exports, and commodity price ranges. A good deal of estimation has been included in some of the graphs and tables, and although these are likely to give a good idea of trends within particular countries, their usefulness for making closer comparisons between developments in one country and another may be less certain.

With such a range of subjects for each of the thirteen countries condensed into 325 pages, much of the information is necessarily very brief. Nevertheless, the booklet includes a great deal of information not previously assembled in this way. For the person who wishes to discover the methods used in one or other of the countries, it is a very useful source of information, and it forms a valuable record of the present extent of development of many aspects of marketing.

A.F.G.

British Trees: A Guide for Everyman. MILES HADFIELD. Dent. 30*s*.

Books on British trees are so numerous that a new arrival merits attention only if it presents unusual features of illustration or description. Miles Hadfield's work is to be welcomed, for it does both. For twenty-five years he has been making sketches of the botanical details of our common garden, forest, and orchard trees, and the resulting collection covers 150 kinds, each illustrated by about eight small drawings. A particularly valuable feature is the inclusion of drawings of *seedling* trees, so unlike their parents but so important to forester, naturalist, and nurseryman. Although there are no photographs, nor even sketches of actual young or adult trees to show their individual form, the collection of botanical drawings is so clear and comprehensive that this book is certain to become a standard work.

The text is lucid, and each tree is fully described in plain English without undue recourse to botanical terms. The author has consulted a wealth of literature, from Loudon's classic of 1838 to the latest bulletins of the Forestry Commission. His treatment of difficult groups, like the elms and the whitebeams, is sensible and thorough. But among so much diligently-amassed information it is distressing to detect an occasional blunder. Thus sycamore, an excellent firewood, is described as "non-inflammable", and the statement that Scots pine trees are useless until mature is contradicted by the millions of thinnings which are harvested annually for fence rails, pit props, fibreboard, paper pulp, and a dozen other uses. Nor can anybody who has seen Scots pine thriving 2,000 feet up the Cairngorm Hills accept Mr. Hadfield's statement that "in Britain it is not a mountain tree". Despite such slips, this book fills a real gap in the literature of our forest flora, and the author and publishers have made available a vast amount of information at a very reasonable price.

H.L.E.

Isles of Flowers: The Story of the Isles of Scilly. ERNEST KAY. Alvin Redman. 18*s*.

Though only 28 miles from Land's End, the tiny archipelago of the Scilly Isles is quite " un-English " in its way of life, its colouring and its climate. Mr. Kay's book is a detailed and conversational guide, and it quickly reveals the very deep affection which he obviously feels for the island. Despite its title, however, only one chapter is devoted to the literally vital flower-growing industry, and many of the author's observations must be accounted superficial. For example, he says " most of the new varieties (of narcissus) are imported from Holland " and he makes no mention of the many British raisers who have contributed largely to Scillonian bulb stocks.

Small inaccuracies and omissions of this kind occur throughout the book and are naturally irritating to Island readers.

The coming of Income Tax to the Isles in 1953 is graphically dealt with, and Mr. Kay takes what I think is a gloomy view in suggesting that it may lead to the evacuation in the near future of the islands of St. Agnes, Bryher and St. Martins. He seems to underestimate the doggedness of the true native, who will continue to wrest a living from his rocky windswept land, as he has done in spite of every setback in the past—and there have been many.

One of the best chapters in the book is that dealing with the Dorrien-Smith family, who during the past 120 years has worked unceasingly for the welfare of the inhabitants.

Earlier writers and historians have been heavily drawn upon, and these extracts blend well with the vivid descriptions of each of the Islands, their flora, bird-life and individual charm.

New visitors to the Isles could not do better than gain their first impressions from this book, which is excellently illustrated.

W.J.M.

The Chemistry and Mode of Action of Plant Growth Substances. (Proceedings of a Symposium held at Wye College, University of London, July 1955.) Edited by R. L. WAIN and F. WIGHTMAN. Butterworths (London), Academic Press (New York). 55*s*.

The proceedings of this symposium are divided into four sections. In the first, which deals with natural auxins and contains seven papers, the importance of paper partition chromatography as a tool in the study of naturally occurring plant growth substances is clearly demonstrated. The second and largest section consists of ten papers concerned with the effect of chemical structure on biological activity. Metabolism and mode of action are discussed in the third section, and finally, there are two papers on the kinetics of auxin-induced growth.

With the recent rapid developments in the field of plant growth regulating substances, this excellently printed and produced volume, which provides up-to-date accounts of fundamental research, should prove valuable to both chemists and biologists engaged in this research.

D.W.

Liver-fluke Snails in Britain. ALAN MOZLEY. H. K. Lewis. 9*s*.

In the most leisurely way, this little book introduces the reader to the liver-fluke snail. We are taught how to find and recognize it, where to look, why it is important, and what the farmer ought to do to render dangerous places safe. The author takes us on the most delightful country walks in England, Scotland and Wales, and shows the likeliest places to look. The text is written in the clearest possible English, and should be equally interesting and useful to farmers, students and schoolboys.

Liver-fluke disease of sheep and cattle is transmitted by the snail *Lymnaea truncatula*, and if the snail can be destroyed the disease must disappear. Drenching with carbon tetrachloride, although still necessary, is regarded as a poor palliative. It is much better to kill the snails, and being delicate creatures they are easily destroyed. There is no doubt that successful drug treatment of the disease has been to the snail's advantage—how few countrymen know this snail—but the author thinks we should become more "snail" minded, and carry the warfare to roadside ditches, open field-drains, quarries, gateways, etc. This excellent book tells us clearly what to do.

W.L.S.

Tornadoes in England: May 21, 1950. (Meteorological Office Geophysical Memoir No. 99.) H. H. LAMB. H.M. Stationery Office. 7*s*. 6*d*. (7*s*. 9*d*. by post).

On the afternoon of 21st May, 1950, a colleague, rushing home to avoid the impending thunderstorm, noted with apprehension the most unusual capering of dark clouds. Within a very short time damage amounting to £50,000 had been done by a tornado, the violence of which has seldom been exceeded, even in the United States. This devastating calamity occurred in England!

H. H. Lamb's Geophysical Memoir No. 99, apart from providing a graphic account of this particularly violent tornado in England, is also a praiseworthy example of scientific co-operation in the assessment and recording of tornadoes. The Geophysical Year is a particularly appropriate time to issue this report.

From Wendover in the Chilterns to Ely in the Fens the path of devastation extended for some sixty-five miles like the lash of a giant whip; its width varied from a few feet to many yards. Fully-grown elm and walnut trees were twisted, uprooted and left lying in all directions in a path fifty yards wide in places. As the whirlwind crossed a canal a column of water was lifted and sucked into the atmosphere. Roofs of houses were lifted off and walls collapsed outwards. Roads were blocked and a double-decker bus overturned. A large Dutch barn on six-inch iron girders was twisted up and the bales of hay blown out. A Nissen hut was whisked away and the floor left spiked fifty feet above the ground on the topmost branch of a neighbouring tree. Leaf-shaped hailstones 1–1½ inches in diameter and ¼–½ inch thick were deposited in the path of the storm, and in five areas rain to the extent of 200 tons of water an acre was deposited.

This is the account which is naturally of great interest to the "man in the street". To the serious student of weather physics there is much of scientific interest

in the report which, apart from describing this particular tornado also records previous occurrences in England and Europe. There is a valuable bibliography.

In view of the interest which will be taken by members of the public, I feel it rather a pity that a glossary has not been included to describe the precise meaning of such words as, for example, "sferic" lightning flashes.

Very great credit goes to Mr. Lamb and to his fellow investigator, Mr. J. Simmons, for the plain and very able presentation of all the facts.

J.R.S.

The National Institute of Agricultural Botany Thirty-Seventh Report and Accounts, 1956. 2*s*.

The N.I.A.B. is probably most widely known through its Farmers' Leaflets which recommend crop varieties. The extensive work behind these recommendations is evident from the annual report. Interim comments are made on forty-five cereal varieties still undergoing performance trials, and variety tests with many other farm crops and vegetables are reported.

Research established that early sowing gave highest yields for both spring and winter beans, and that 200–300 lb per acre is the most economic seed rate. A soil insecticide gave a better control of weevil in spring beans than a spray, and a nitrogen top dressing helped to reduce losses caused by this pest.

Carlsberg barley grown from seed which had been given a hot-water bath (36 hours at 76°F), was completely free from loose smut. This single bath treatment would be more economical than the usual hot-water method of smut control, and work to establish the best time and temperature is continuing. A spring dressing of 2 cwt per acre of "Nitro-Chalk" produced a 20–25 per cent increase in the protein content of oat straw.

Humble bees seem to be more important as pollinators for red clover than honey bees, and have a big influence on seed yields. Chemically defoliated lucerne seed had a 28 per cent moisture content (against one of 13·9 per cent for seed from tripodded crops) and had to be dried after combining, and rethreshed. Final yields were the same. Close spacing in sugar beet increased seed yields. Average yields at 9-, 18- and 36-inch spacings were in the ratio 3:2¼:1¼.

The Institute is now responsible for multiplication of pure seed stocks bred at the official plant breeding stations as well as for the Cereal Field Approval and Herbage Seed Certification Schemes.

Copies of the report are obtainable from the Secretary, N.I.A.B., Huntingdon Road, Cambridge.

S.L.

Selection, Use and Maintenance of Agricultural Machinery. O.E.E.C., Paris. H.M. Stationery Office, London. 8*s*. (8*s*. 3*d*. by post).

This book deals with one of three farm machinery projects adopted by O.E.E.C. It contains the papers read, and a summary of the conclusions reached at the International Training Course on Machinery Usage and Maintenance, held at Uppsala, Sweden, in November, 1955.

The introductory paper stresses the need for rational choice and correct maintenance of machinery, stating that the estimated agricultural machinery bill for the ten member countries during 1955 was three thousand million dollars. The value of correct choice, usage and maintenance of machinery and the problems associated with the training of operators, mechanics and advisory officers are underlined in the succeeding papers.

It is interesting to note how speakers agree that agricultural subjects should be included in the training of engineers and machinery advisory officers, because of the interaction of machine and environment in the form of differing soil and crop conditions.

The conclusions show a general agreement that at no level of agricultural education is enough attention paid to machinery subjects. The need for further research into the performance and costing of farm machinery is also stressed.

Although the papers are rather general in nature, they do indicate that the member countries have many problems in common. The methods adopted by some, particularly in the field of education, might well meet the requirements of others, if modified to their particular needs.

R.L.S.

Binder and Baler Knotters. (R.I.B. Publication No. 41.) Rural Industries Bureau. 3*s*.

The knotter mechanism of binders and balers has always been a mystery to many people. By carefully explaining how the different parts of the knotter work, this concise publication does much to remove the mystery. Clear diagrams demonstrate correct and faulty knots, the reason for the troubles which arise are explained, and the adjustments necessary to rectify the faults are given. Although all the common makes of knotters contain the same essential parts, there are certain differences in construction which require varying tensions in the twine to give the best results. A useful table of correct tensions for the various makes of knotters is included.

There is a section on the routine to be followed when making a full inspection of a self binder, and a complete list of the tests and checks to be made for a thorough overhaul.

The pick-up baler is becoming increasingly important, and we are reminded that the tying mechanism of this type of baler follows the same principles as that of the binder. Most troubles are due to faulty adjustments, and most machines will function properly if correctly set. This publication will provide valuable assistance to the intelligent user who wishes to make these necessary adjustments.

E.K.G.

Recommended Common Names for Pesticides. (British Standard 1831:1957.) 7*s*. 6*d*.

The British Standards Institution has brought up to date the list of recommended common names for pesticides, and has published it in the form of a single volume to replace the earlier Part I and Part II issued in 1952 and 1953 respectively.

It has been the custom since the introduction of synthetic chemicals as pesticides, to seek abbreviations for lengthy chemical names. DDT and BHC, for example, have become common parlance. With the ever-increasing spate of new pesticides with ever-lengthening names, it became imperative that there should be some standardization in the coining of simpler names, and this the B.S.I. Committee have achieved quite successfully. The learned members of the Chemical Society, London, may refer to S-1:2-di (ethoxycarbonyl) ethyl dimethyl phosphorothiolothionate, but their American colleagues will use a slightly different terminology; the less erudite, however, will no doubt prefer the B.S.I. recommendation of malathion.

The sixty-four common names proposed—twice the number contained in the original publications—embrace most of the pesticides used in Great Britain at present, and the list contains many now familiar names. In my opinion, the only blemish in this otherwise excellent booklet is the use of the initials HHDN and HEOD for the active ingredients of aldrin and dieldrin respectively; rather than introduce fresh symbols it might have been preferable to refer to these products as aldrin 100 and dieldrin 100.

R.J.S.

Rothamsted Experimental Station Report, 1956. 10*s*.

Research work carried out on soils, crop nutrition, crop diseases and plant pests is very fully described in this report. Though the approach to some of the problems investigated might seem, at first sight, to be more academic than practical, the link between science and practice is never completely absent. Many of the experimental results have a close bearing on farm practice, so that farmers who like to keep in touch with what is new in scientific agriculture will find no lack of observations and conclusions that actively concern them.

The following points, taken at random from the report, illustrate this. Placement of fertilizers seems to have a special value when fertilizer dressings are restricted. Spraying potatoes with persistent insecticides combined with roguing have given vigorous seed stocks in England at a cost comparing favourably with that of buying new seed. Investigation of virus disease in grasses and clovers suggests that the benefit of ploughing old pastures and reseeding may be due to the replacement of virus-infected plants with uninfected ones.

Studies of the photo-synthetic activity of the leaves of wild beet and of modern strains of sugar beet show that prolonged selection of beet for high yield has failed to increase the photo-synthetic

activity of the leaves. Trials at Woburn indicate that under suitable conditions sweet lupins and the improved American strains of birdsfoot trefoil may prove to be useful fodder crops in this country.

The report also includes three articles of a general nature dealing respectively with tropical soils, soil structure, and the electronic computer used at Rothamsted.

Copies of the report are obtainable from the Librarian, Rothamsted Experimental Station, Harpenden, Herts.

A.J.L.L.

Watching Birds (Revised Edition). JAMES FISHER. Collins. 8*s*. 6*d*.

Any book by James Fisher is welcome, and this revised, stiff-covered edition of an old favourite should sell like the proverbial hot cakes. The author writes as he broadcasts, with authority, charm and modesty—the last attribute being one that is seldom found among professional ornithologists.

The book is as nearly a complete guide to the subject as the bird-watcher is ever likely to get. The chapters on "Introducing the Bird-watcher to the Bird" and "The Tools of Bird-watching" are models of concise and useful information, and that on "What You Can Do" of especial value to the tyro.

It would be hard to fault the book in any way, but the perfectionist may perhaps feel that the addition of a chapter on "What You Should *Not* Do" would have been of value. Most people will echo Mr. Fisher's wish for more bird-watchers, always provided that these use care and have a due regard for the welfare of their subjects. The sad truth is that at the present time there are far too many bird-watchers and photographers who are doing as much harm to our bird life as the old-time, "clutching" egg-collector of infamous memory used to do. I know of many instances of birds being caused to desert their nests, and one, in particular, where a pair of very rare birds which would almost certainly have nested had they been allowed to do so in peace, were scared out of the district by blundering bird-watchers and would-be photographers. This sort of thing is the prime reason why many rare occurrences go unrecorded by naturalists who, once bitten, have become permanently shy.

The many drawings which illustrate the book are both good and well chosen. The photographs are, at the lowest estimate, adequate, and in many instances are both rare and excellent. The beautiful corncrake study by G. K. Yeates is outstanding in pictorial and technical merit.

This book is essential to the budding ornithologist, and one can give it no higher praise than to say that it ranks with the same author's *Bird Recognition*.

F.H.L.

Farmhouse Cheesemaking: Some Financial Considerations for the Farmer. (University of Bristol, Department of Economics Report No. 100.) V. H. BEYNON and J. A. LANGLEY. 2*s*. 6*d*.

There are now only 140 farmhouse makers of cheese, as compared with 1,121 in 1939. However convincing the financial case made out by the authors of this report for so-called "additional profits" in cheesemaking, few farmers nowadays are attracted to embracing such an enterprise; more, the prospect of any revival of interest must be regarded as remote.

The authors refer to the significance between what one might describe as "farm household cheesemaking" and cheesemaking on the farm on such a scale as to justify the special employment of a cheese-maker. The former is placed at 80–100 gallons a day, the latter at a minimum of 200 gallons a day. Many of the considerations of financial returns are common to both, that is, the conversion rate, production of cheese of high quality and the Milk Marketing Board's net regional price for the milk used. It is in the costs per lb of cheese made that the great disparity lies between the two types of enterprise, and comparisons are difficult enough when all the milk used is produced on the cheese-maker's own farm; they are far more difficult when the scope of the enterprise is widened and milk is bought from neighbouring farmers. The cost of such purchased raw material cannot properly be regarded as one of the items of "additional costs" in cheesemaking; it falls in a separate category from labour, fuel, and depreciation, but the probable additional cost of pasteurizing such milk is not referred to.

Among a number of tables, one gives a picture of additional returns from farmhouse cheesemaking, as compared with selling milk by wholesale, at the basic

conversion rate of 119 gallons to 1 cwt of cheese. This is shown as a little over 6½*d.* per gallon of milk used. It is against this return that the prospective farmhouse cheese-maker must measure his prospective costs of manufacture. The value of the report lies in showing him how he can measure this, but he may also need the assistance of a qualified accountant.

K.H.B.

Practical Shepherding. H. G. CLARKE. Farmer and Stock-Breeder. 7*s.* 6*d.*

Many who have recently gone in for sheep as a profitable sideline on the mixed farm will read this little book with interest. But *experienced* sheep men will soon become impatient with the many slips, half-truths and certain blatant errors made. These destroy the reader's confidence and distract him from the very considerable good advice given. Chapters are devoted to the starting of a grass flock; mating, wintering and lambing (the lambs seem all destined for the store sales); shearing, weaning and dipping. It is good to find that the author insists on the importance of the gentle handling of sheep at every stage.

Good photographs have added interest to the book, but one on dipping should be exchanged for a more workmanlike example at the first opportunity.

If in subsequent editions some of the errors could be corrected, the book would fulfil a very real need.

W.R.S.

The Advancement of Science, Vol. XIV, No. 54. The British Association for the Advancement of Science. 7*s.* 6*d.*

The addresses given at the September, 1957 meeting of the British Association have now been published. They cover a wide range of subjects, and the farmer reader will be particularly interested in the address by Sir James Turner on *The Role of Agriculture in the National Economy.*

Copies are obtainable from the Association at Burlington House, London, W.1.

Books Received

Crop Production: Principles and Practices (Revised Edition). H. D. Hughes and E. R. Henson. Macmillan. 48*s.* 6*d.*

Sheep Husbandry Diseases. Allan Fraser and John T. Stamp. Crosby Lockwood. 35*s.*

Robert Bakewell: Pioneer Livestock Breeder. H. Cecil Pawson. Crosby Lockwood. 25*s.*

Livestock Improvement in Relation to Heredity and Environment (4th Edition). J. E. Nichols. Oliver and Boyd. 16*s.*

Soil-Plant Relationships. C. A. Black. Chapman and Hall (London), Wiley (New York). 56*s.*

Portrait of the Chilterns. Annan Dickson. Hale. 18*s.*

Farm Organisation and Incomes in South West England, 1955. (Report No. 101). S. T. Morris, H. W. B. Luxton and G. D. D. Davies. Department of Economics, University of Bristol. 5*s.*

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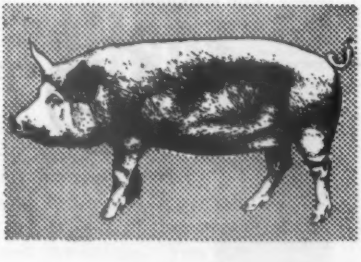

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